Federal Agency for Nature Conservation

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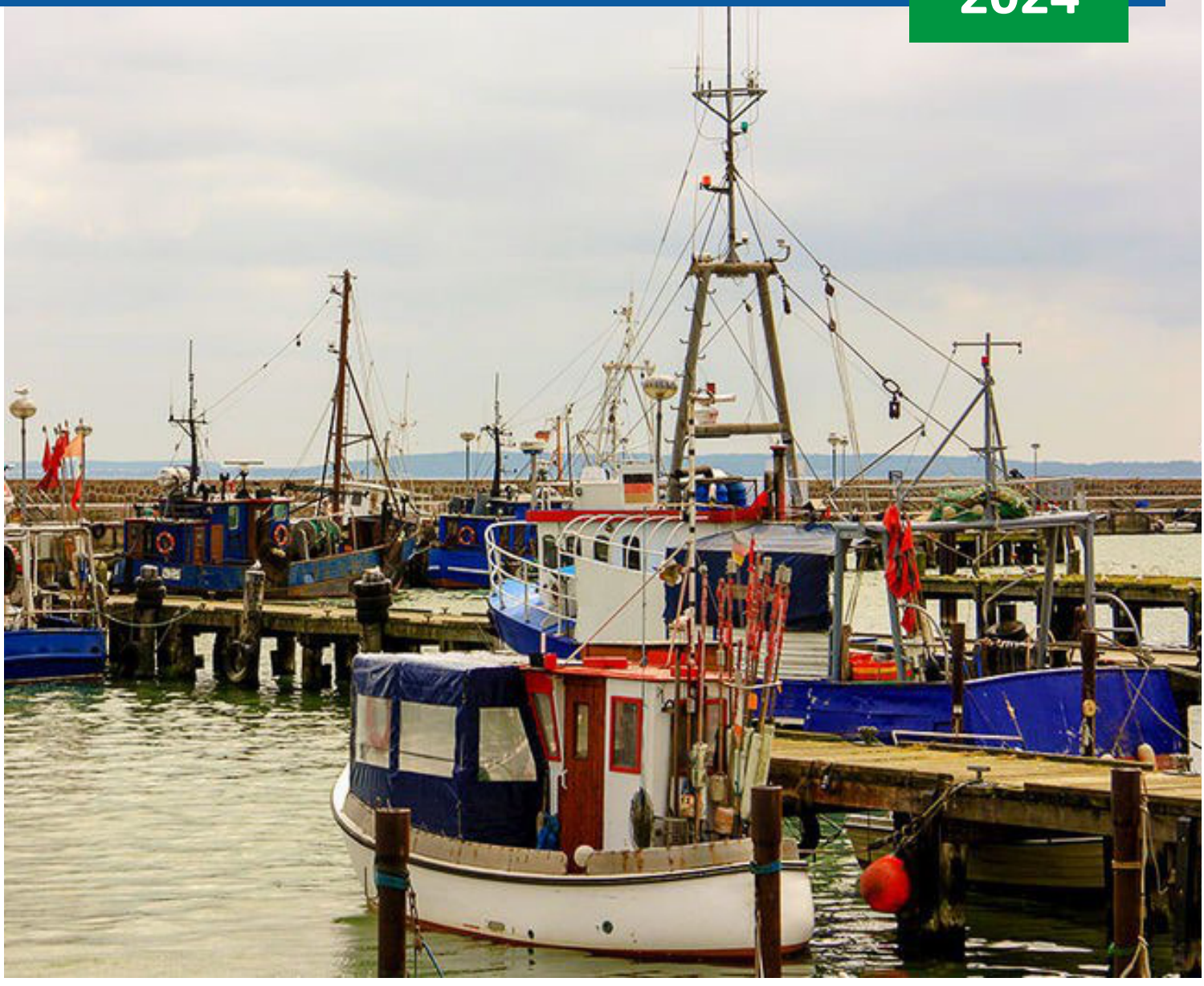

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Imprint

Cover Picture: Fishing vessels with static nets (K. Wollny-Goerke)

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Zusammenfassung

Stellnetze (Kiemen- und Verwickelnetze) sind weit verbreitete, kostengünstige, effiziente und einfach zu handhabende Fanggeräte. Gleichzeitig ist die Stellnetzfischerei jedoch mit Beifang verbunden, insbesondere dem unbeabsichtigten, unerwünschten Fang von Nichtzielarten. Beifang stellt eine große Bedrohung für verschiedene geschützte Arten dar, insbesondere Meeressäugetier- und Seevogelarten. In der deutschen Ausschließlichen Wirtschaftszone (AWZ) in der Ostsee macht die Fischerei mit Stellnetzen die Hauptfischereitätigkeit und den Großteil der Fischereiflotte aus. Zu den Arten, bei denen ein besonders hohes Beifangrisiko besteht, gehören Schweinswale (*Phocoena phocoena*), einschließlich Individuen der vom Aussterben bedrohten Population der zentralen Ostsee, und mehrere geschützte Seevogelarten, beispielsweise die Eisente (*Clangula hyemalis*) und Trauerente (*Melanitta nigra*).

Um empfindliche Arten zu schützen und ihren günstigen Erhaltungszustand, wie er in den Naturschutzzielen der EU-Habitat- und Vogelschutzrichtlinie definiert ist, zu erhalten oder wiederherzustellen, ist es dringend erforderlich, den Beifang in der Stellnetzfischerei zu verhindern oder zumindest zu minimieren. Für die vom Aussterben bedrohte Schweinswalpopulation der zentralen Ostsee erhöht jeder weitere Beifang das Aussterberisiko.

In der deutschen AWZ der Ostsee wurden umfangreiche Natura 2000-Gebiete zum Schutz von Arten und Lebensräumen ausgewiesen. Natura 2000-Gebiete sind wichtige Lebensräume für geschützte Arten, die ihnen als Kinderstube, Nahrungs- und Rastplätze dienen. Deshalb ist es von entscheidender Bedeutung diese ökologischen Funktionen durch die Umsetzung wirksamer Fischereimanagementmaßnahmen in diesen Gebieten zu schützen. Bei wandernden Arten wie z.B. Schweinswalen muss das gesamte Verbreitungsgebiet berücksichtigt werden, wenn effektive Erhaltungsmaßnahmen geplant werden.

Trotz der Notwendigkeit, Beifänge geschützter Arten zu minimieren, ist die Stellnetzfischerei in der Ostsee bisher weitgehend unreguliert und es fehlt an einem kohärenten Management-, Kontroll- und Durchsetzungssystem. Maßnahmen zur Minderung von Beifängen sowohl innerhalb als auch außerhalb von Natura 2000-Gebieten, wie etwa räumlich-zeitliche Schließungen oder andere Maßnahmen, die darauf abzielen, die nachteiligen Auswirkungen der Stellnetzfischerei auf geschützte Arten zu verringern, müssen zeitnah umgesetzt werden.

Mit dem vorliegenden Dokument sollen die Grundlagen für den Prozess der Entwicklung von Managementmaßnahmen zur Regulierung der Stellnetzfischerei in der deutschen AWZ der Ostsee geschaffen werden. Es präsentiert den Kenntnisstand des BfN zu diesem Thema und unterstreicht die aus naturschutzfachlicher Sicht dringende Notwendigkeit von Maßnahmen, die den Beifang empfindlicher Arten in der Stellnetzfischerei wirksam reduzieren können. Das Dokument verfolgt dabei zwei Ziele:

Erstens liefert es Informationen über den politischen und wissenschaftlichen Hintergrund zum Thema Beifang in der Stellnetzfischerei. Das Dokument gibt einen Überblick über den Zustand geschützter Arten in der deutschen AWZ in der Ostsee und die jeweiligen Risiken, die die Stellnetzfischerei für sie darstellt. Darüber hinaus wird eine langfristige Strategie entwickelt, die eine Verlagerung von der Stellnetzfischerei hin zu alternativen, umweltverträglichen Fanggeräten in der deutschen AWZ vorsieht.

Zweitens wird eine Reihe von Managementmaßnahmen im Einklang mit den politischen Zielen und den besten verfügbaren wissenschaftlichen Erkenntnissen vorgeschlagen.

Konkret werden drei Maßnahmen benannt: Maßnahme M1: Ausschluss der Stellnetzfischerei aus allen Natura 2000-Gebieten in der deutschen AWZ der Ostsee; Maßnahme M2: Einrichtung einer Fangverbotszone (No-take Gebiet) in einem Teil des Natura 2000-Gebiets Pommersche Bucht mit Oderbank; Maßnahme M3: Die vorläufige verpflichtende Anwendung von akustischen Abschreckvorrichtungen (Acoustic Deterrent Devices (ADDs)) in allen Stellnetzen in Gebieten außerhalb von Natura 2000-Gebieten in der AWZ für maximal 5 Jahre, während gleichzeitig eine Umstellung auf alternative Fangmethoden angestrebt werden sollte. Darüber hinaus wird eine Reihe von Monitoring-, Überwachungs- und Kontrollmaßnahmen sowie begleitender Forschungsbedarf vorgeschlagen. Abschließend wird ein Fahrplan für den nationalen und EU-Konsultationsprozess für Fischereimanagementmaßnahmen vorgelegt, um deren zeitnahe Umsetzung zu unterstützen.

Abstract

Static nets (gillnets and entangling nets) are widely used, low-cost, efficient, and easy-to-handle fishing gears. At the same time, however, static net fisheries are associated with bycatch, namely the incidental, unwanted catch of non-target species. Bycatch presents a major threat to several protected species, among them marine mammal and seabird species. In the German Baltic Exclusive Economic Zone (EEZ), fisheries with static nets account for the main fishing activity and the majority of the fishing fleet. Among the species that have a high risk of being bycaught are harbour porpoises (*Phocoena phocoena*), including individuals of the critically endangered Baltic Proper population, and several protected species of seabirds, including for example the long-tailed duck (*Clangula hyemalis*) and the common scoter (*Melanitta nigra*).

To protect sensitive species and to maintain or restore their favourable conservation status (as defined in the nature conservation goals set by the EU Habitats and Birds Directives), there is an urgent need to halt or at least minimize bycatch from static net fisheries. For the critically endangered harbour porpoise population of the central Baltic, any further bycatch increases the risk of it becoming extinct.

Extensive Natura 2000 sites were established in order to protect species and habitats in the German Baltic EEZ. Since Natura 2000 sites constitute important habitats for protected species, such as nursery, feeding and resting grounds, it is crucial to safeguard these functions by implementing effective fisheries management measures in these sites. However, for species with migratory characteristics, the whole distributional range needs to be considered when planning effective conservation measures.

Despite the urgency to minimize bycatch of protected species, static net fisheries in the Baltic are largely unregulated, lacking a coherent management, control, and enforcement system. Bycatch mitigation measures inside as well as outside Natura 2000 sites need to be implemented in a timely manner; for example, spatio-temporal closures or other actions aimed at reducing the adverse effects from static net fisheries on protected species.

The present document aims to facilitate the process of developing management measures for static net fisheries in the German Baltic EEZ. It presents the level of knowledge of BfN on the issue, highlighting the urgent need for sound measures that can effectively reduce bycatch of sensitive species from static net fisheries from a nature conservation point of view. It serves two main functions:

Firstly, a repository of information on the policy, research, and science background on the matter is provided. The paper reviews the status of protected species in the German Baltic EEZ and the risks that static net fisheries pose to them. Furthermore, a long-term strategy is set forward envisioning a shift away from static net fisheries to alternative, environmentally-sound types of fishing gear in the German EEZ.

Secondly, a set of management measures in line with policy objective and best available science is put forward. Specifically, three measures are suggested. Measure M1: exclusion of static net fisheries from all Natura 2000 sites in the German Baltic EEZ; Measure M2: establishment of a no-take-zone in part of the Natura 2000 site Pomeranian Bay with Odra Bank; Measure M3: interim mandatory use of Acoustic Deterrent Devices (ADDs) in all static nets in areas outside Natura 2000 sites in the German Baltic EEZ for a maximum of five years, while a shift to alternative fishing methods is pursued at the same time. Additionally, a set of monitoring, control, and enforcement measures is suggested as well as accompanying research

needs. Finally, a roadmap for the national and EU consultation process for fisheries management measures is presented in order to support their timely implementation.

1 Introduction

1.1 Background and scope of the document

The German Baltic Exclusive Economic Zone (EEZ) is home to unique habitats and a variety of protected animal species. Among them are marine mammal species (harbour porpoises, harbour seals, grey seals), several seabird species including migratory birds that use areas of the German EEZ as a resting and feeding ground in winter (such as the long-tailed duck and the razorbill), as well as rare fish species (e.g., sturgeon, twait shad). At the same time, the Baltic Sea is an intensively-used sea basin, resulting in a high exposure of species and habitats to human activities and their effects. In consequence, the status of many of these species and habitats can be adversely affected by the multitude of human uses in the basin (HELCOM, 2018).

Commercial fishing is one of the uses that can have substantial environmental impacts. In coastal waters in the Baltic Sea, static nets are the principal fishing gear used, mostly by vessels of a relatively small size less than 12 m length (<12 m). Static nets encompass "any type of gillnet, entangling net or trammel net that is anchored to the seabed for fish to swim into and become entangled or enmeshed in the netting" (European Parliament and Council, 2019[1]). They are widely used due to their ease of operation and low operation and maintenance costs. However, a major caveat of static nets is the risk of bycatch (Larsen et al., 2021; Meyer and Krumme, 2021). Besides fish, higher taxa species such as marine mammals or seabirds also have a high risk of being bycaught in static nets; this is caused by the structure of the nets and the long duration of the fishing operation (immersion time of nets).

Static nets are mostly made from thin nylon twine and hang like a flexible wall (for vessels >12 m up to 21 km total length of nets; and <12 m up to 9 km) in the water column for long periods (up to two days) (see Annex, Tab. A1). Non-target species can get entangled in the net, which is barely visible and, in consequence, air-breathing animals will drown, while fish may starve or suffocate. The unwanted catch of non-target species is called incidental (by)catch or simply bycatch. In a comparison between different fishing gear types, bycatch was found to be the highest in static gear (Lewison et al., 2014). In the German Baltic EEZ, the main species incidentally bycaught in static net fisheries are harbour porpoises and wintering seabirds, particularly in important resting and feeding areas such as the waters of the Pomeranian Bay.

Despite the presence of numerous policies that dictate the protection of sensitive, endangered, or vulnerable species and habitats, the practical implementation and enforcement of such measures are at present largely absent. To that end, environmental matters are frequently not given consideration and priority when managing maritime activities and uses (HELCOM, 2021). Importantly, only a few management measures are currently in place for fisheries within protected areas in the German Baltic EEZ, namely a prohibition of any kind of trawl fishery and similar gear in parts of the Odra bank (EU Council, 1997[2]); a Regulation for recreational fishing in certain parts[3]; and recent measures developed in the context of the EU

[1] Regulation (EU) 2019/1241 of the European Parliament and of the Council on the conservation of fisheries resources and the protection of marine ecosystems through technical measures, OJ L 198, 25.7.2019, p. 105-201.

[2] Council Regulation (EC) No 88/98 of 18 December 1997 laying down certain technical measures for the conservation of fishery resources in the waters of the Baltic Sea, the Belts and the Sound.

[3] https://www.bfn.de/themen/meeresnaturschutz/nationale-meeresschutzgebiete.html

policy process of the Baltic Sea regional fisheries body (BALTFISH), regulating static net fisheries within certain areas in the German EEZ for certain time periods in order to protect the Baltic Proper harbour porpoise (EU Regulation 2022/303). Additionally, an EU process to regulate mobile active bottom-contacting fishing in German Marine Protected Areas (MPAs) in the Baltic EEZ was initiated by Germany in 2021 and is ongoing.

Although static nets are known to have adverse impacts on protected species, and the German Coalition Agreement from 2021[4] affirms willingness for environmentally-sound regulation of static net fisheries, a national process to implement management measures has not yet started. Nonetheless, the negative impacts of static net fisheries have to be minimized in order to reach the nature conservation goals set by the EU Habitats and Birds Directives, as well as other EU policies (Marine Strategy Framework Directive (MSFD); Common Fisheries Policy (CFP)), and key international (United Nations Sustainable Development Goals; Convention on Biological Diversity), regional (HELCOM Recommendations, HELCOM Baltic Sea Action Plan; ASCOBANS Jastarnia Plan), and national law and policies (National Biodiversity Strategy, German Federal Nature Conservation Act, Regulations for Nature Conservation Areas). Specifically, the absence of bycatch mitigation measures is hindering the achievement of conservation objectives since the state of some ecological features is critical, for example the Baltic Proper harbour porpoise population. Thus, the development and prompt implementation of measures to safeguard protected species is urgently needed. Furthermore, with key commercial fish stocks in the western Baltic being severely overfished (namely cod and herring), and the latest scientific advice being for zero catches for the species in the area (ICES 2022a; 2022b), such measures will also make an important contribution in rebuilding depleted fish stocks. Stock rebuilding is identified as a prerequisite in ensuring the profitability of the German Baltic fleet and the long-term sustainability of static fisheries in the area (STECF, 2021).

This document aims to support the development of management measures for static net fisheries in order to reach conservation goals in the German Baltic EEZ. Specifically, the document serves **three main purposes**:

- Firstly, it compiles and assesses the current knowledge and policy framework regarding bycatch of protected species in static net fisheries from a nature conservation point of view. Thus, it will serve as **background information** in a possible national consultation process on regulating static net fisheries in the German EEZ and, subsequently, in the process of developing an EU Joint Recommendation (JR) according to Article 11 and 18 of the CFP (Chapters 1 to 3).
- Secondly, the document seeks to facilitate both the national and EU consultation processes by **proposing a set of management measures**, as well as outlining a future shift away from static nets to alternative, environmentally friendly types of fishing gear (Chs. 4 and 5).
- Thirdly, it proposes a **roadmap** for the national and EU consultation process for fisheries management measures in order to support their timely implementation (Ch. 6).

[4] Mehr Fortschritt wagen. Bündnis für Freiheit, Gerechtigkeit und Nachhaltigkeit. Koalitionsvertrag 2021 – 2025 zwischen der Sozialdemokratischen Partei Deutschlands (SPD), BÜNDNIS 90 / DIE GRÜNEN und den Freien Demokraten (FDP)

1.2 Policy framework

The need to safeguard protected habitats and species and to develop dedicated management measures for the mitigation of negative environmental impacts from fishing is a legal requirement stemming from international, EU, and national policy. Table 1 presents the key policies relevant to the protection of species and habitats as well as fisheries that dictate the need for management and bycatch mitigation measures.

Table 1: Regulatory and Policy Framework: Main provisions for safeguarding species and habitats and reducing environmental impacts from fishing.

Regulatory and Policy Frameworks
International
United Nations, Sustainable Development Goal 14 – Life below water
Convention on Biological Diversity, Global Biodiversity Framework
EU
Habitats Directive, (HD) 92/43/EEC
Birds Directive, (BD) 2009/147/EC
Marine Strategy Framework Directive (MSFD), 2008/56/EC
Common Fisheries Policy (CFP), EU 1380/2013
Regulation on the conservation of fisheries resources and the protection of marine ecosystems through technical measures (Technical Measures Regulation), EU 2019/1241
Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. EU Biodiversity Strategy for 2030: Bringing nature back to our lives
Regional
HELCOM: Baltic Sea Action Plan, Recommendation 17/2
ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas): Recovery Plan for Baltic Harbour Porpoises (Jastarnia Plan), Resolution on the Baltic Proper harbour porpoise
National
German Federal Nature Conservation Act (BNatSchG)
Regulations for Nature Conservation Areas

The Birds Directive (2009/147/EC) and the Habitats Directive (92/43/EEC) constitute the backbone of the EU policy framework for nature conservation. They require Member States to protect sensitive species and habitats. Several of the species and habitats found in the German Baltic Sea are listed in the Annexes of these Directives, making it a legal requirement for Germany to implement relevant conservation measures, especially for “species of community in-

terest"[5], such as the harbour porpoise. In particular, the harbour porpoise is listed under Annex IV of the Habitats Directive and thereby requires strict protection throughout its entire natural range. The German Federal Nature Conservation Act (BNatSchG) transposes the provisions of the EU Habitats and Birds Directives into German federal law. Additional objectives for protected species and habitats exist in German national marine Nature Conservation Areas, as defined in their respective establishment regulations ("Verordnung über die Festsetzung der Naturschutzgebiete").

The overarching goal of the MSFD (2008/56/EC) is to achieve Good Environmental Status (GES) in European marine waters, with the original target year of 2020. A key objective is the maintenance of biodiversity, namely "the quality and occurrence of habitats and the distribution and abundance of species" as specified in the MSFD. Other major objectives include achieving healthy populations of commercial fish species and ensuring the long-term abundance and reproduction. The goal of reaching GES by 2020 was not achieved by Germany nor other EU-Member States. Therefore, further actions and intensified efforts are needed in order to achieve the goal as soon as possible. The latest progress report of the MSFD implementation (EUCOM, 2020b) recognizes the "incidental bycatch" as one of the main challenges that need to be addressed in the Baltic Sea.

Ambitious conservation objectives are also set forward in the framework of emerging global (United Nations Sustainable Development Goals[6]; Convention on Biological Diversity Global Biodiversity Framework[7]) and EU policy: The EU Biodiversity Strategy (EUCOM, 2020a) contains important commitments to be delivered by 2030. A major commitment includes the establishment of a coherent network of protected areas, encompassing at least 30% of EU waters, further noting that at least 10% of EU sea should be "strictly protected". In its recent note on criteria and guidance for protected areas designations, EUCOM (2021)[8] elaborates on strict protection by defining that in these areas "natural processes are left essentially undisturbed by human pressures and threats". Following this definition, strict protection would entail non-intervention areas, which could mean no-take-zones with regard to fisheries.

Safeguarding species and habitats and reducing environmental impacts from fishing is a major provision not only of environmental legislation but also of the CFP (EU Regulation 1380/2013) which is the main legislation for governing and managing fish resources and fisheries in EU waters. Fundamental provisions of the CFP are the precautionary principle and the ecosystem-based approach to fisheries management. Specifically, fishing activities should not have adverse environmental impacts on both fish stocks and the marine environment. To that end, measures must be taken for safeguarding the marine environment and minimizing negative impacts of fishing activities, including avoiding and reducing incidental catches of protected species. The CFP also states that special attention is necessary for biologically sensitive areas and Marine Protected Areas. According to these requirements, measures for managing fish-

[5] Species which are within in the territory of the European Union listed in Annexes II, IV, and V of the Habitats Directive.

[6] Goal 14 Life below water, e.g., target 14.2: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.

[7] Effective conservation and management of at least 30 per cent of the world's land, coastal areas and oceans.

[8] European Commission, 2021. DG ENV. Note on criteria and guidance for protected areas designations ENV.D.3/JC, 23 pp.

eries must ensure the continued existence or, if necessary, the restoration of favourable conservation status for protected animal species.

Technical Measures (EU Regulation 2019/1241) were developed to contribute to achieving the objectives of the CFP, in particular also with regard to incidental catches of sensitive marine species, including those listed under the EU Habitats and Birds Directives. According to Article 3, it should be ensured that "incidental catches are minimised and where possible eliminated so that they do not represent a threat to the conservation status of these species". In ICES Subdivision 24 (c/f Annex, Fig. A1), the only technical mitigation measure listed with regard to cetacean bycatch is the mandatory use of ADDs on any bottom-set gill net or entangling net for vessel with an overall length of 12 m or more and the recent measures stemming from EU Regulation 2022/303. ADDs have the potential to reduce bycatch by 50-80 % in operational gillnet fisheries compared to nets without them (Orphanides and Palka, 2013). However, according to the Technical Measures Regulation, this restriction is mandatory only for vessels with an overall length of 12 m or more, although most vessels fishing with static nets in the German Baltic Sea are smaller, resulting in very limited applicability of the measure. With regard to seabird bycatch, measures are only proposed if proven that incidental catches constitute a serious threat to the conservation status of the species and if measures (such as scaring lines and/or weighted lines) are proven to have a conservation benefit. In consequence, monitoring of bycatch is a requirement to establish management measures according to this Regulation, although a valid monitoring system for bird and cetacean bycatch has not been set up so far and attempts to improve bycatch monitoring (e.g., HELCOM Roadmap on Fisheries Data) have not yet resulted in better data.

Although the necessity for fisheries management measures to protect sensitive species is highlighted in the above-mentioned policies, developing and implementing these measures in the EEZ is a complex task since it has to be conducted in a regional process when the fishing activity of other EU Member States might be affected. As such, measures need to be agreed upon jointly by all Member States with fisheries interests in the areas in a JR according to the provisions of Articles 11 and 18 of the EU CFP. In a recent report[9], EU COM explicitly states concerns with regard to levels of speed and ambition in the process of developing JRs to restrict fisheries and concludes that improvements are necessary.

1.3 State of play

Concerning the bycatch of protected species, the need for timely action to fulfil legal obligations was again stressed in February 2020 by Virginijus Sinkevicius, EU Commissioner for Environment, Oceans and Fisheries. In his letter addressed to the Fisheries and Environment Ministers of 22 Member States, he called for urgent action to protect the Baltic Proper harbour porpoise population and the common dolphin in the Bay of Biscay (c/f European Commission Statement, 2020[10]). This was followed by an ICES Advice on Emergency Measures to prevent the bycatch of those species (ICES, 2020b), which proposed the immediate implementation of

[9] EUCOM, 2021. Report from the Commission to the European Parliament and the Council. Implementation of the Technical Measures Regulation (Article 31 of Regulation (EU) 2019/1241), 11 pp. Available at: https://ec.europa.eu/transparency/documents-register/detail?ref=COM(2021)583&lang=en. Accessed: 17.12.2021.

[10] Statement by EU Commissioner Sinkevičius on EU action on bycatch of dolphins and other marine animals, 25/2/20. Available at: https://ec.europa.eu/commission/presscorner/detail/en/statement_20_328

a combination of a set of measures, namely: (i) closures for static net fisheries in Natura 2000 sites; and (ii) the obligatory use of pingers on static nets outside protected areas within the distribution range of the Baltic Proper harbour porpoise. Since then, discussions on management measures to protect the Baltic Proper harbour porpoise population have been ongoing in the competent committees (BALTFISH, BSAC) and commitment to implement mitigation solutions has been reiterated in the Ministerial Declaration from September 2020[11]. Subsequently, a draft JR to prevent bycatch of the Baltic Proper harbour porpoise, which also includes seasonal management measures in parts of the German EEZ, was submitted by BALTFISH to the European Commission in December 2020, followed by a second JR in September 2021.

However, it should be noted that the ICES Workshop (2020a), conducted in preparation of the ICES advice (ICES, 2020b), included more ambitious measures than the ones set forward by the BALTFISH JRs: in Germany, the latter include a three-month closure for static nets within Natura 2000 sites in the Eastern German Baltic Sea (November to January), as opposed to a six-month closure of the same areas (November to April) originally suggested by the ICES Workshop to fully protect species from the critically endangered population in their seasonal distribution range.

The second JR, with additional measures in one Swedish protected area and specifications with regard to control measures, was agreed upon by the BALTFISH committee in July 2021 and submitted to the European Commission in September 2021. In February 2022, based on the two JRs submitted by BALTFISH, a delegated Regulation (2022/303)[12] entered into force. It includes regulation of static net fisheries in selected Swedish, Danish, German, and Polish areas and the mandatory use of ADDs on static nets in certain Swedish and Polish sites. However, it didn't account for the necessity to implement bycatch mitigation measures throughout the whole distribution range of the Baltic Proper harbour porpoise, as recommended by ICES (ICES, 2020b).

In parallel, discussions and commitments to protect the harbour porpoise have also been advancing in other fora. Under the framework of HELCOM, the urgency to protect the harbour porpoise has been addressed in its revised[13] recommendation 17/2 on the protection of the harbour porpoise in the Baltic Sea area, to which Germany committed itself. The urgency in protecting the harbour porpoise is also acknowledged in the Recovery Plan for Baltic Harbour Porpoises (Jastarnia Plan, 2016[14]) of ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas) and the ASCOBANS resolution on the Baltic Proper harbour porpoise from September 2020. Recommendations on the prevention of cetacean bycatch were published by the joint working group from ASCOBANS and

[11]Our Baltic Conference – Declaration of the Ministers of Environment, Maritime Economy, Agriculture and Fisheries of Baltic Sea Member States and of the Commissioner for 'Environment, Oceans and Fisheries' from 28/09/2020

[12]Commission Delegated Regulation (EU) 2022/303 of 15 December 2021 amending Regulation (EU) 2019/1241 as regards measures to reduce incidental catches of the resident population of the Baltic Proper harbour porpoise (*Phocoena phocoena*) in the Baltic Sea

[13]From March 2020, adopted by HELCOM 41-2020.

[14]ASCOBANS Recovery Plan for Baltic Harbour Porpoises – Jastarnia Plan (2016 Revision), Helsinki, Finland.

ACCOBAMS [15]. Furthermore, measures in the new HELCOM Baltic Sea action plan[16] are focussed on the protection of harbour porpoises from the Belt Sea and Baltic Proper population, as well as seabirds and protected fish species. With regard to the Baltic Proper harbour porpoise population, it comprises the aim of achieving the close to zero target for bycatch by 2022. Regarding the Belt Sea population, according to the BSAP, measures should be put in place by 2024 because a substantially lower mortality than the one currently occurring is necessary to safeguard the population. Specifically, the mPBR (modified Potential Biological Removal) mortality limit for this population was estimated at 29 individuals, substantially lower than the current bycatch estimates for the species (ca. 700) (Owen et al., 2022).

This highlights the fact that discussions on bycatch mitigation measures need to be expanded to include additional conservation features in the area which are currently not addressed by ICES and BALTFISH (especially harbour porpoise of the Belt Sea population, protected seabird species) in order to develop a comprehensive set of measures to improve the overall status of protected species throughout the German EEZ.

As for the BfN, ecosystem-based fisheries management and bycatch mitigation have been research priorities over the past 15 years, with its active engagement in relevant research and policy processes. These include past projects (e.g., Environmentally Sound Fisheries Management in Marine Protected Area - EMPAS project; Pusch and Pedersen, 2010) and studies (Pedersen et al. 2009; Bellebaum, 2011; Sonntag et al., 2012), as well as the formulation of proposals for fisheries management (Sell et al., 2011). Research is also being conducted with regard to developing alternative fishing gear (STELLA project, 2015-2019, and STELLA II, started in 2021), also with a focus on protecting harbour porpoises from the risk of bycatch in static net fisheries. The management measures for static net fisheries proposed in the present document are largely based on this knowledge and experience: management measures for static net fisheries were jointly formulated by the Thünen Institute (TI) and the BfN, the two competent authorities for managing fish resources and protected features in the German EEZ (Sell et al., 2011). A preliminary agreement between TI and BfN was obtained for the respective measures for the protection of seabirds, proposing temporal and spatial exclusion of static net fisheries in Pomeranian Bay Nature Conservation Area (NCA). Nonetheless, the process has been halted since then, with the exception of the developments with BALTFISH with regards to the Baltic Proper harbour porpoise population.

[15]Recommendations from the 1st meeting of the joint bycatch working group of ACCOBAMS & ASCOBANS (02/2021).

[16]HELCOM Baltic Sea Action Plan (BSAP) – 2021 update. HELCOM, 2021.

2 Nature Conservation in the German Baltic EEZ

2.1 Protected species and habitats in the German Baltic EEZ

In the marine protected areas of the German Baltic EEZ, two fish species, three marine mammal species, twelve seabird species, two habitat types as well as two biotope types are protected according to EU and/or German federal legislation (Tab. 2).

Harbour porpoise

Two populations of harbour porpoise are resident in the German Baltic EEZ: the Belt Sea (western Baltic) population and the Baltic Proper population (Tiedemann et al., 2017, Carlén et al., 2018). The latter is critically endangered (IUCN and HELCOM: Hammond et al., 2008; HELCOM, 2013) and shows a downward population trend with an estimated number of less than 500 animals (Hammond et al., 2008; ICES, 2020a). The abundance of the Belt Sea population has been estimated to be 17,301 harbour porpoises (95% CI = 11,695 - 25,688) in the last survey (MiniSCANS II, 2020). That was the lowest abundance estimate since the first survey was conducted in 1994, although the variance of these surveys is high and a trend analysis is necessary to determine trends (Unger et al., 2020). Overall, the conservation status of harbour porpoises in the German Baltic Sea has been evaluated to be unfavourable-bad (U2) under monitoring according to the obligations of the Habitats Directive. The future perspective of harbour porpoises has been evaluated as unfavourable-bad as well.

Both harbour porpoise populations use German waters to a different extent: while the western Baltic population is present in the German waters all year round (Benke et al., 2014), the animals of the Baltic Proper population presumably use at least the eastern part of the German Baltic Sea between November and April (Carlén et al., 2018, c/f Annex, Fig. A2). It is unknown how far west the individuals of the Baltic Proper population migrate. In general, the abundance of harbour porpoises is decreasing from west to east in the German Baltic Sea (Benke et al., 2014). The German MPAs in the Baltic Sea EEZ are intensively used by harbour porpoises: hydro-acoustic measurements show frequent and regular presence of harbour porpoises in all areas, with high detection rates of up to 100% porpoise positive days in the protected areas of Fehmarn Belt and Kadet Trench (Benke et al., 2014; Gallus and Brundiers, 2019), and lower detection rates in the Pomeranian Bay with recently up to 70% porpoise positive days in summer (Gallus and Brundiers, 2019). A smaller peak in detections in the area of the Pomeranian Bay in winter is attributed to animals from the critically endangered Baltic Proper population (Benke et al., 2014). The importance of German waters as a habitat for harbour porpoises on a basin-wide scale has recently been evaluated in the framework of the third Holistic Assessment of the state of the Baltic Sea (HOLAS) under HELCOM (Sveegaard et al., 2022). Results show that German waters of the Baltic Sea east of the winter management border at 13° E, including the Pomeranian Bay, can be considered as of high importance for the Baltic Proper population and the western waters of variable seasonal importance for the Belt Sea population, with an area of high importance identified in Fehmarn Belt MPA (c/f Annex, Fig. A3). Due to the overlap of the distribution of harbour porpoise and static net fisheries, a high risk of bycatch exists since harbour porpoises can only detect static nets at very short distances, get easily entangled and drown (c/f Ch. 3.2).

Table 2: Overview of protected species, habitats, and biotopes in the German Baltic marine protected areas EEZ.

EU-Code	Feature	Legislative Protection	Status*
	Species		
1351	Harbour porpoise (*Phocoena phocoena*)	Annex II and IV HD	U2
1364	Grey seal (*Halichoerus grypus*)	Annex II HD	U1
1365	Common seal (*Phoca vitulina*)	Annex II HD	U1
1103	Twait shad (*Alosa fallax*)	Annex II HD	U2
5042	Baltic sturgeon (*Acipenser oxyrinchus*)	Annex II HD	U2
A064	Long-tailed duck (*Clangula hyemalis*)	Migratory bird	
A065	Common scoter (Melanitta nigra)	Migratory bird	
A066	Velvet duck (*Melanitta fusca*)	Migratory bird	
A006	Red-necked grebe (*Podiceps grisegena*)	Migratory bird	
A007	Eared grebe (*Podiceps auritus*)	Annex I Birds Directive	
A001	Red-throated diver (*Gavia stellata*)	Annex I Birds Directive	
A002	Black-throated diver (*Gavia arctica*)	Annex I Birds Directive	
A502	White-billed diver (*Gavia adamsii*)	Migratory bird	
A200	Razorbill (*Alca torda*)	Migratory bird	
A199	Common guillemot (*Uria aalge*)	Migratory bird	
A202	Black guillemot (*Cepphus grylle*)	Migratory bird	
A182	Common gull (*Larus canus*)	Migratory bird	
	Habitat type (Annex I Habitats Directive) **/ Biotope type (**§30 Federal Nature Conservation Act)		
1110	Sandbanks	Annex I HD / § 30 BNatSchG	U1
1170	Reefs	Annex I HD / § 30 BNatSchG	U1
	Species-rich gravel, coarse sand and shell	§ 30 BNatSchG	
	Seagrass and other marine macrophytes	§ 30 BNatSchG	

***:** The conservation status (Status) is evaluated for features protected under the Habitats Directive (HD; categories used are: FV-favourable, U1-unfavourable-inadequate, U2-unfavourable-bad, XX-unknown, evaluations from the last HD report from 2019). Evaluation results from www.bfn.de/themen/natura-2000/berichte-monitoring/nationaler-ffh-bericht.html.

Common seal and grey seal

Common and grey seals were rare in the German Baltic coast and adjacent waters in the second half of the last century, but their numbers have recently been growing. The grey seal population in the Baltic Sea has increased considerably since the 1970s due to ambitious policy targets and the adoption of stringent management measures, such as a prohibition of hunting and a ban of certain organohalogen compounds. This success story highlights the positive impacts effective management may have on populations of endangered species. However, there also remains a high risk of bycatch for these species due to the overlap in their distribution with commercial fisheries, as in the case of harbour porpoise (Vanhatalo et al., 2014; van Beest et al., 2019). In addition, predation of seals on fish caught in static nets and eventual damage to the nets can have negative impacts on the catch and cause conflicts with fisheries.

Seabirds

Three seabird species occurring in the marine waters of the German Baltic are listed under Appendix I of the Birds Directive. It lists the species that require special protection measures because, for example, these species are threatened with extinction or are considered rare due to their small population or their limited local distribution. For these species, Member States are required to take protective measures to ensure their survival and reproduction in their distribution area, which also explicitly includes declaring the most suitable areas as protected areas. In addition, the regularly occurring migratory bird species must be protected by developing and maintaining their reproductive, moulting, and wintering grounds as well as resting and feeding areas.

In the German Baltic, an area of international importance as a winter resting area for sea birds is the Pomeranian Bay, with the shallow Odra bank taking a central position. Internationally notable concentrations of seabirds spend the winter in the feeding grounds of the Pomeranian Bay, among them many protected species (Tab. 2, Fig. 1 A-C). Pomeranian Bay SPA is of special importance for the long-tailed duck (*Clangula hyemalis*) as a resting and overwintering habitat. The long-tailed duck is of outstanding ecological importance in Pomeranian Bay SPA as a consumer of benthic bivalves and has an average winter population of 145,000 individuals, which accounts for 9.1 % of the biogeographic population, which is assessed at 1,600,000 individuals (Wetlands International 2019).

The common scoter (*Melanitta nigra*) is present all year round in Pomeranian Bay SPA. After a relatively low abundance during winter, maximum in abundance is reached during spring, with an average of 230,000 individuals (BfN 2020). In summer, the Pomeranian Bay is also considered an important moulting area for common scoters. Since sea ducks are unable to fly during the moulting phase, they are particularly dependent on undisturbed marine areas. Static net fisheries in the Pomeranian Bay pose a high bycatch risk to diving seabirds all year round because they cannot detect the monofilament set nets under water while searching for food, they get entangled and drown.

Abundance and trends in seabird occurrence in German waters on a single-species base are available from the following website: https://geodienste.bfn.de/seevoegeltrends?lang=en.

As an example, the distribution of three selected sea bird species of high conservation relevance in the German Baltic are shown in Figure 1 A-C, with a focus on the importance of Pomeranian Bay SPA (from https://metadaten.bfn.de/BfN-MetaCat/?lang=de#/).

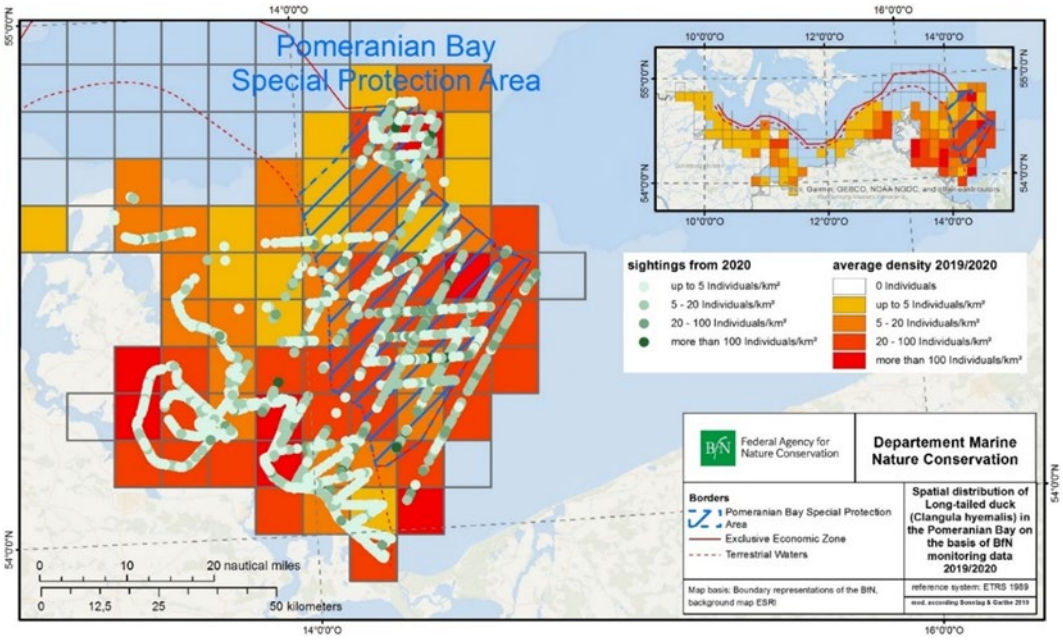

Figure 1A: Distribution of long-tailed duck (*Clangula hyemalis*) in Pomeranian Bay SPA, based on monitoring data 2019/2020 from BfN.

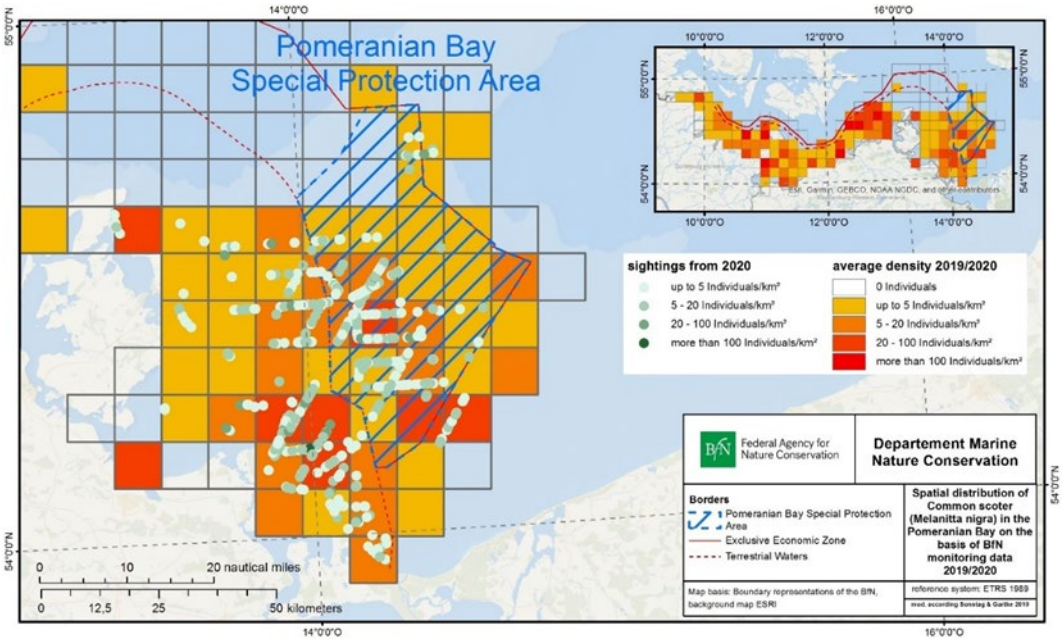

Figure 1B: Distribution of common scoter (*Melanitta nigra*) in Pomeranian Bay SPA, based on monitoring data 2019/2020 from BfN.

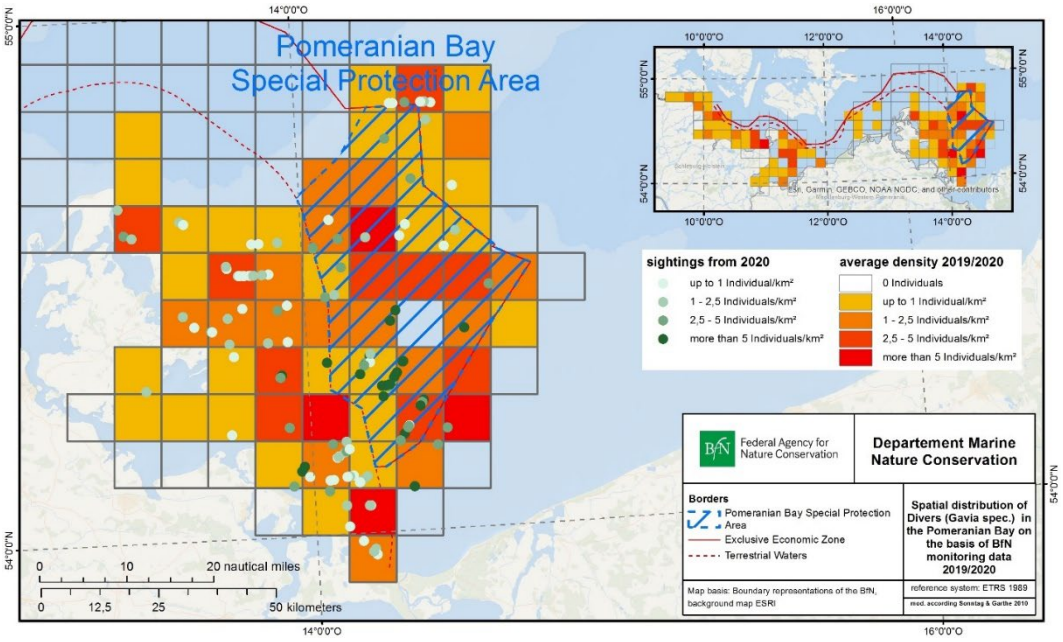

Figure 1C: Distribution of divers (*Gavia sp*.) in Pomeranian Bay SPA, based on monitoring data 2019/2020 from BfN.

Fish species

Since specific fish monitoring methods to evaluate the presence of fish species that are protected under Annex II of the Habitats Directive yet need to be developed, there is limited knowledge on the occurrence and distribution in the EEZ in the German Baltic Sea.

The twait shad (*Alosa fallax*) is one of the fish species listed in Appendix II of the Habitats Directive, for which the most evidence for its occurrence is available in the German Baltic EEZ. The main areas of distribution of this migratory fish are the estuaries of the large rivers, where twait shads aggregate for spawning migration. In addition to water pollution, to which this species of fish is very sensitive, the main threats for twait shads are the establishment of migratory obstacles, changes in water morphology (river deepening) and bycatch in various fisheries. There is evidence that the species is bycaught in commercial static net fisheries (ICES, 2020c), but the extent of the problem in Germany and other Baltic countries is unknown.

The last native Baltic sturgeon (*Acipenser oxyrinchus*) in the Baltic Sea was caught 1996 off Estonia. In the same year, BfN launched a long-term project to reintroduce the species in the Baltic Sea. As part of the project several thousand young sturgeons were reintroduced in the Odra river, which flows into the Baltic Sea. Nonetheless, the situation remains more than critical and conservation and restauration of river habitats as well as the prevention of sturgeon being bycaught in static net fisheries are necessary for reintroduction schemes to be successful.

Habitats

Two habitat types in the German Baltic EEZ are protected under Annex I of the Habitats Directive: sandbanks and reefs (Tab. 2). There are different types of sandbanks found in the German Baltic, for example a mega ripple field in the Fehmarn Belt and the shallow sandbank of the Odrabank. The stone reefs are found in the channels of the Fehmarn Belt and Kadet Trench as well as in the Pomeranian Bay where representative stony slopes and reefs popu-

lated with mussel beds and macrophytes are found in the Adlerground and Western Rönnebank. In addition, the biotope type species-rich gravel, coarse sand and shell layers protected under §30 of the Federal Nature Conservation Act is found in the area around the Fehmarn Belt.

Although little information exists on the direct physical impacts of static net fisheries in the region on the sea floor, these are expected to be substantially lower than those of mobile, bottom-contacting gear fisheries. Nonetheless, studies in other locations suggest that impacts of static nets on benthic communities can be pronounced (Purroy et al., 2014). Adverse impacts also occur through the removal of substantial fish biomass which can alter food webs and benthic community composition, thus indirectly affecting protected habitats (c/f Ch. 3.2).

2.2 Conservation objectives of Natura 2000 sites in the German Baltic EEZ

To protect the above-mentioned species and habitats, several Natura 2000 sites in the German Baltic EEZ were designated based on the presence and distribution of these conservation features. To ensure that the populations of these species survive and recover, it is necessary to maintain and restore: a) the natural quality of key/essential habitats, especially to ensure the protection from harm, b) the species' population size and quality, c) the direct and indirect food sources including age range and geographical distributions, d) the sites' biological productivity and geo-hydro-morphology and e) unfragmented habitats with their ecological functions.

Currently, the Natura 2000 network covers 2,470 km^2 or about 55% of the total 4,452 km^2 of the German Baltic EEZ (BfN, 2020). Five sites were designated according to the Habitats Directive as Sites of Community Importance (SCIs) and were later designated as Special Areas of Conservation (SACs): i. Fehmarn Belt, ii. Kadet Trench, iii. Western Rønne Bank, iv. Adler Ground, and v. Pomeranian Bay with Odra Bank (Fig. 2). One site has been designated as a Special Protection Area (SPA) under the Birds Directive: vi. Pomeranian Bay.

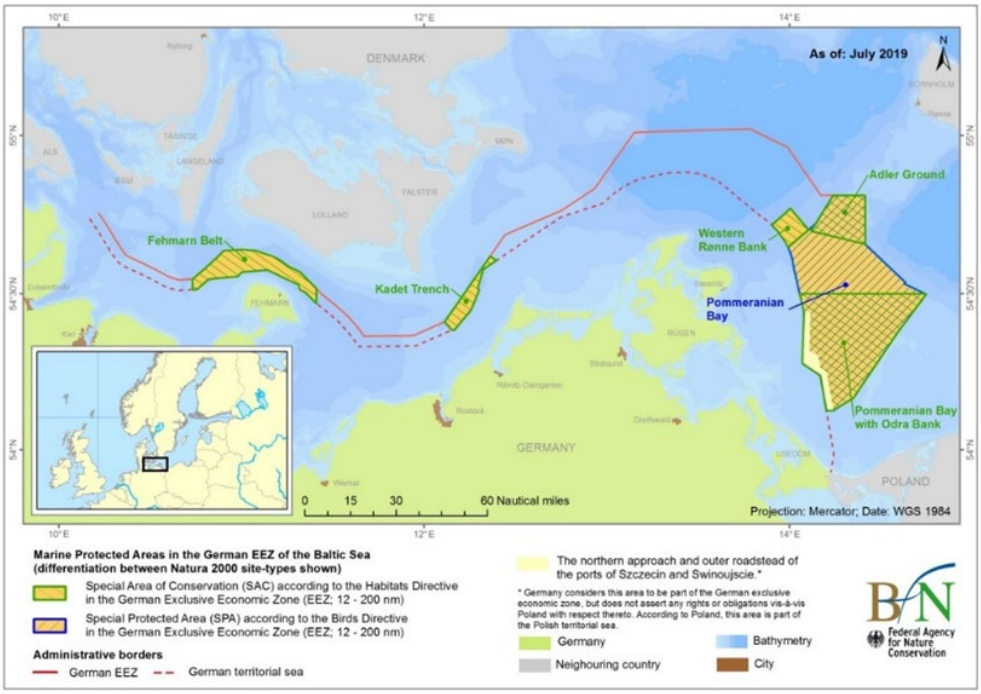

Figure 2: Natura 2000 sites in the German Baltic EEZ.

The above-mentioned Natura 2000 sites were designated as German NCAs. Fehmarn Belt NCA and Kadet Trench NCA correspond to the SACs of the same name. Pomeranian Bay - Rønne Bank NCA includes the SACs of: Western Rønne Bank; Adler Ground; and Pomeranian Bay with Odra Bank, as well as Pomeranian Bay SPA, which partially overlap and form a so-called complex area. Table 3 presents the six Natura 2000 sites and the relevant protected species according to Annex II of the Habitats Directive and the Birds Directive.

Table 3: Overview of Natura 2000 sites and Nature Conservation Areas in the German Baltic EEZ and their protected conservation features.

Natura 2000 site	Federal Nature Conservation Area	Protected marine mammal and fish species					Protected bird species
		Harbour porpoise	Grey seal	Common seal	Twait shad	Baltic sturgeon	
Fehmarn Belt SAC DE 1332-301	Fehmarn Belt[17]	•	-	•	-	-	
Kadet Trench SAC DE 1339-301	Kadet Trench[18]	•	-	-	-	-	
Western Rønne Bank SAC DE 1249-301	Pomeranian Bay - Rønne Bank [19]	•	-	-	-	-	
Adler Ground SAC DE 1251-301		•	•	-	-	-	
Pomeranian Bay with Odra Bank SAC DE 1652-301		•	-	-	•	•	
Pomeranian Bay SPA DE 1652-301		-	-	-	-	-	Red-throated diver Black-throated diver Red-necked grebe Eared grebe White billed diver Long-tailed duck Common scoter Velvet duck Common gull Common guillemot Razorbill Black guillemot

A black dot (•) indicates that the species is listed as a protective feature in the respective site, the hyphen-minus (-) indicates that it is not, although it may still occur there (please note: Pomeranian Bay SPA overlaps spatially with the SACs of Adler Ground and Pomeranian Bay with Odra Bank).

[17]Verordnung über die Festsetzung des Naturschutzgebietes "Fehmarnbelt", Bundesgesetzblatt 2017
[18]Verordnung über die Festsetzung des Naturschutzgebietes "Kadetrinne", Bundesgesetzblatt 2017
[19]Verordnung über die Festsetzung des Naturschutzgebietes "Pommersche Bucht – Rönnebank", Bundesgesetzblatt 2017

3 Main conflicts between static net fisheries and nature conservation objectives

3.1 Static net fisheries in the German Baltic

Small-scale fisheries (SSFs) using static nets constitute the vast majority of the German fishing fleet in the Baltic Sea (ICES, 2019; Döring et al., 2020; STECF, 2021a; 2021b; Meyer and Krumme, 2021). Their activity is mostly concentrated within ICES Subdivisions (SDs) 22 and 24 (c/f Annex, Fig. A1). Owing to the brackish water nature of the Baltic, key target fish species include both saltwater and freshwater species (ICES, 2019; Döring et al., 2020; Meyer and Krumme, 2021), notably herring, cod, and various flatfish species (e.g., plaice, flounder, turbot). Herring is mostly fished during the spring spawning season, mainly in SD 24. Cod and flounder are caught in SDs 22 and 24 all year round, except peak summer months. Plaice is caught in SD 22 during the fourth/first quarter and turbot in SD 24 in the second quarter (ICES, 2019). SSFs are of high socio-economic significance in the German Baltic, employing an estimated 841 crew on 687 vessels in 2019. SSFs landings amounted to 4,335 tons and generated approximately 6.17 million EUR in revenues in 2019 (STECF, 2021a; 2021b; Tab. 4).

Table 4: Key parameters of fishing activity of German Baltic Sea fleets, 2019.

	Estimated no. of vessels	Total vessel tonnage (GT)	Engaged crew (no.)	FTE nat. (no)	Days-at-sea (d)	Live weight of landings (kg)	Value of landings (EUR)	Revenue (EUR)
SSF	687	1,872	841	500	57,669	4,335,194	6,007,215	6,173,880
LSF	28	1,641	54	40	3,065	7,704,517	6,668,214	7,577,894

Where SSF: Small-scale fisheries (mostly static nets), LSF: Larger scale fisheries, i.e. vessels >12 m; FTE. Full Time Equivalent. After: STECF, 2021b, Table A38

Regulations for the management of static net fisheries in the Baltic Sea include, among others, maximum length and immersion time of nets (EU Reg. 2019/1241), while the Total Allowable Catches (TACs) and quotas are set annually for key target species, namely cod, herring, and plaice (ICES, 2019; Döring et al., 2020) (c/f Annex, Tab. A1). In 2022, due to the dwindling western Baltic cod stock, the targeted fishery for cod in SDs 22-24 was not permitted, with only a very small amount (54 ton German TAC) allocated exclusively for bycatch (Council Regulation (EC) 2021/1888)). The latest ICES Advice (2022a) largely echoes the previous assessments, reiterates that the stock is an especially bad state, and also stresses the need for extending measures in the future. Prior to the closure of the fishery, gillnets targeting cod in SD22 were required to have a minimum knot-to-knot (diagonal) mesh size of 110 mm (KüFVO; Funk et al., 2020). The 2022 ICES Advice on fishing opportunities for herring (2022b), also advises that when the MSY approach and precautionary considerations are applied, there should be zero catch for the species in SDs 20-24 for the year 2023.

With regard to monitoring of fishing effort, vessels <12 m in length are exempted from using Vessel Monitoring Systems (VMS) and can use logbooks under the current legal framework (EU Reg. 1224/2009) where they can report location of catch in terms of an ICES Statistical Rectangle (a unit corresponding to 0.5° latitude x 1° longitude). Vessels <10 m (or of a length

of 8 m or more when engaged in cod fishery) are not required to carry a logbook or fill out a landing declaration (EU Reg. 1224/2009; EU Reg. 2016/1139 multi-annual plan for the stocks of cod, herring and sprat in the Baltic Sea). As such, there is an absence of detailed information on fishing effort and location of fishing activity (ICES, 2019), especially for vessels <10 m that constitute the majority of the fleet. This makes it nearly impossible for the authorities to control catch activities of static net fisheries (Döring et al., 2020).

Past studies have tried to address these information gaps, especially in the context of assessing fishing impacts within Natura 2000 sites. The project "Environmentally Sound Fisheries Management in MPAs in Germany" (EMPAS) (Pusch and Pedersen, 2010) assessed the distribution of fishing activities within Natura 2000 sites in the German EEZ. Results included the calculation of fishing effort for different fisheries, including static net fisheries. For static net fisheries, however, values constituted approximations due to the scarcity of primary data for vessels <12 m. Yet, the project conclusively established that fishing effort of gillnet fisheries was substantially high in and around the Natura 2000 sites of Western Rønne Bank and Adler Ground.

A recent assessment of the distribution of international fishing in Natura 2000 sites (von Dorrien, 2022) focused on vessels using VMS. This also included German and Polish static net fisheries with vessels of comparatively larger-size classes (>12 m), thus required to report the exact position of gear deployment. The Adler Ground is an important area for the larger-size classes of the German fleet using gillnets (Fig. 3) with the vast majority of fishing effort for these gears of the static net fishery in the German EEZ concentrated here. The distribution of the fishing effort of Polish gillnet vessels also confirmed a high concentration of fishing activity within the area of the Adler Ground and, to a lesser degree, also within the Pomeranian Bay (Odra Bank) (Fig. 4).

However, fishing effort from commercial gillnet vessels in the Natura 2000 sites in the German EEZ has to be considered to be substantially higher than suggested by the above-mentioned studies; a very large fraction of static gear vessels was excluded from this analysis as vessels <12 m usually do not use VMS. This includes the overwhelming majority of German ones, although they are of similar operational characteristics to their bigger counterparts.

In consequence, there exists a strong need for detailed, fine-scale fishing effort data for vessels <12 m, particularly those using static nets, for determining (among others), hotspots of fishing activities, locations and areas of overlap between the fishery and the presence/high concentration of protected species (ICES, 2020a; Meyer and Krumme, 2021).

In the Belt Sea area (ICES SD 22), recent pilot studies making use of Electronic Monitoring (EM) tools in a representative segment of the Danish commercial gillnet fleet suggest that hotspots of fishing effort, and subsequent locations of high risk of bycatch, are in direct proximity to Fehmarn Belt Natura 2000 site (Larsen et al., 2021). Fishing effort of the Danish gillnet fleet in the Belt Sea has been estimated at an annual mean of 8,911 fishing days between 2010-2018 (official logbooks) (Larsen et al., 2021).

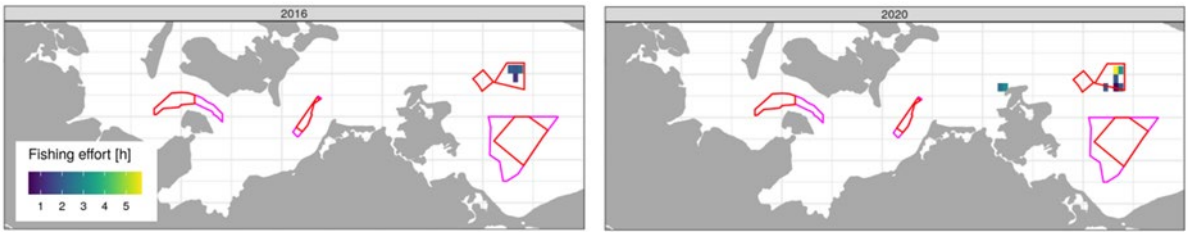

Figure 3: Fishing effort (hours per C-square 0.05° and year) of larger size (>12 m, i.e. using VMS) **German** vessels using anchored gillnets (GNS) in the German Baltic EEZ 2015-2020 (for years where data available for Natura 2000 sites). Source: von Dorrien, 2022, Figs. 18, 19.

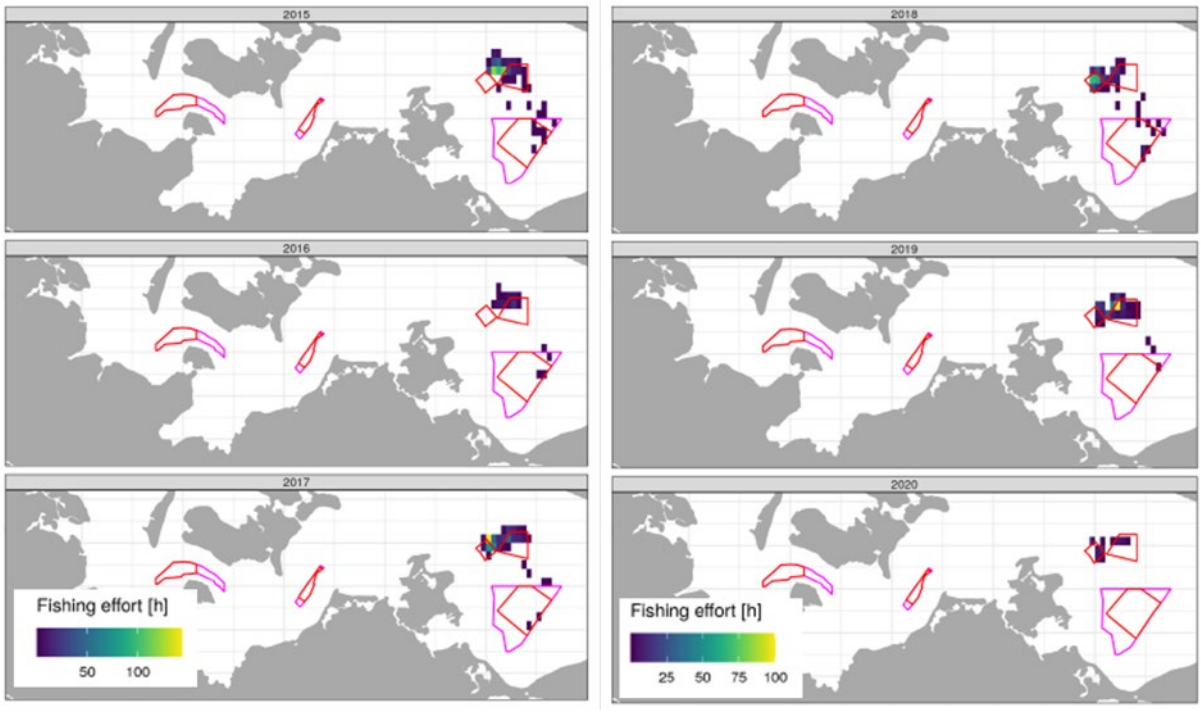

Figure 4: Fishing effort (hours per C-square 0.05° and year) of larger size (>12 m, i.e. using VMS) **Polish** vessels using anchored gillnets (GNS) in the German Baltic EEZ 2015-2020 (note: VMS data from within Natura 2000 sites in the German EEZ available throughout 2015-2020). Source: von Dorrien, 2022, Figs. 34, 35.

3.2 Fisheries' impacts within Natura 2000 and surrounding areas

The use of static gears in the German Baltic EEZ is associated with the bycatch of seabirds (Bellebaum, 2011; Sonntag et al., 2012; Larsen et al., 2021) and marine mammals, especially harbour porpoises (ICES, 2019; 2020a). Bycatch is a major problem in areas that constitute essential habitats for protected species (e.g., foraging areas, migration corridors or routes, nurseries, i.e. Natura 2000 sites).

Diving piscivorous and molluscivorous bird species are particularly threatened as their risk of entanglement in set nets is especially high (Sonntag et al., 2012). It is estimated that approximately 20,000 birds are bycaught annually in the eastern part (Mecklenburg Western Pomerania) of the German Baltic Sea alone, an estimate considered conservative and likely to be substantially higher in reality (Bellebaum, 2011). A recent study in another area of the Baltic Sea found that actual numbers of bycaught seabirds in gillnet fisheries were much higher than officially reported (Morkūnas et al., 2022).

The risk of bycatch of harbour porpoises is particularly high in bottom-set gillnets (ICES, 2020a) for demersal fish species (cod, flatfish) as the nets cannot be readily identified by the harbour porpoises (Mooney et al., 2007). For common and grey seals, risk of bycatch in static net fisheries remains high (Vanhatalo et al., 2014; van Beest et al., 2019), stressing the need for a bycatch mitigation plan. Such a plan should also include measures for the deployment of gear with low bycatch (von Nordheim et al., 2019), such as (seal-safe) fish traps. Since seals have been found feeding on catch in static nets (depredation), potentially damaging the nets, the use of such gear would also help to address this problem.

However, a detailed assessment of the magnitude of the overall impacts from SSFs on protected species is lacking due to the lack of comprehensive information on fishing effort and bycatch (STECF, 2019). Since SSFs are exempted from the use of remote monitoring techniques and marine mammal or fisheries observers for vessels ≤12 m, there is no acquisition of bycatch data for the fleet. Data on risks and impacts of SSFs on protected species stems exclusively from selected projects and research activities.

Past studies on harbour porpoise as well as on diving seabirds assessed the spatial and seasonal overlap between static nets and such protected species to identify areas of "potential conflict" (Pedersen et al., 2009; Bellebaum, 2011; Sell et al., 2011; Sonntag et al., 2012). Areas of high potential conflict included the Adler Ground and Pomeranian Bay (Odra bank), both with respect to seabirds (Fig. 5) and the harbour porpoise (Fig. 6). However, potential conflict and the risk of bycatch in those areas have to be considered as underestimated, owing to the scarcity of data on fishing effort for vessels <12 m without VMS surveillance.

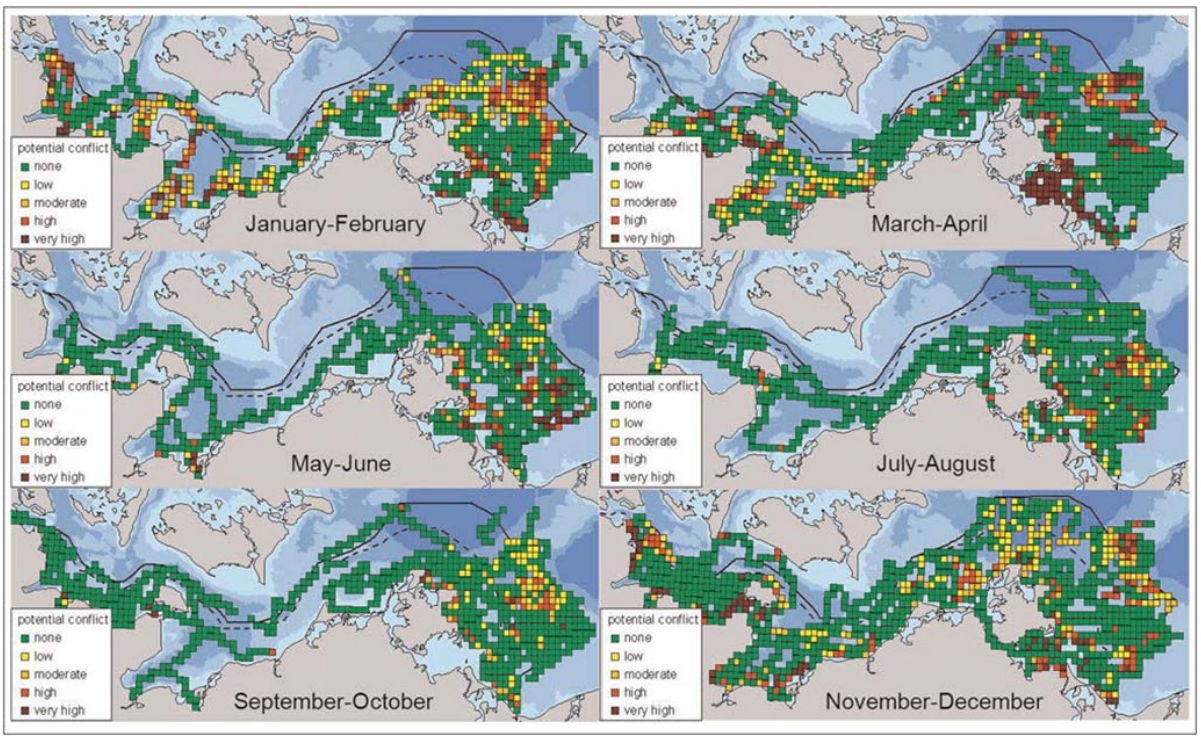

Figure 5: Seasonal overlap of static net fishing activities and vulnerability of diving seabird species in the southern Baltic Sea 2000–2008, illustrated as potential for conflict (PC) from January–December 2000–2008: none (green), low (yellow), moderate (orange), high (red), very high (dark red). Note that very shallow waters have not been surveyed by ship. (From: Sonntag et al., 2012, reproduced by permission of Oxford University Press)

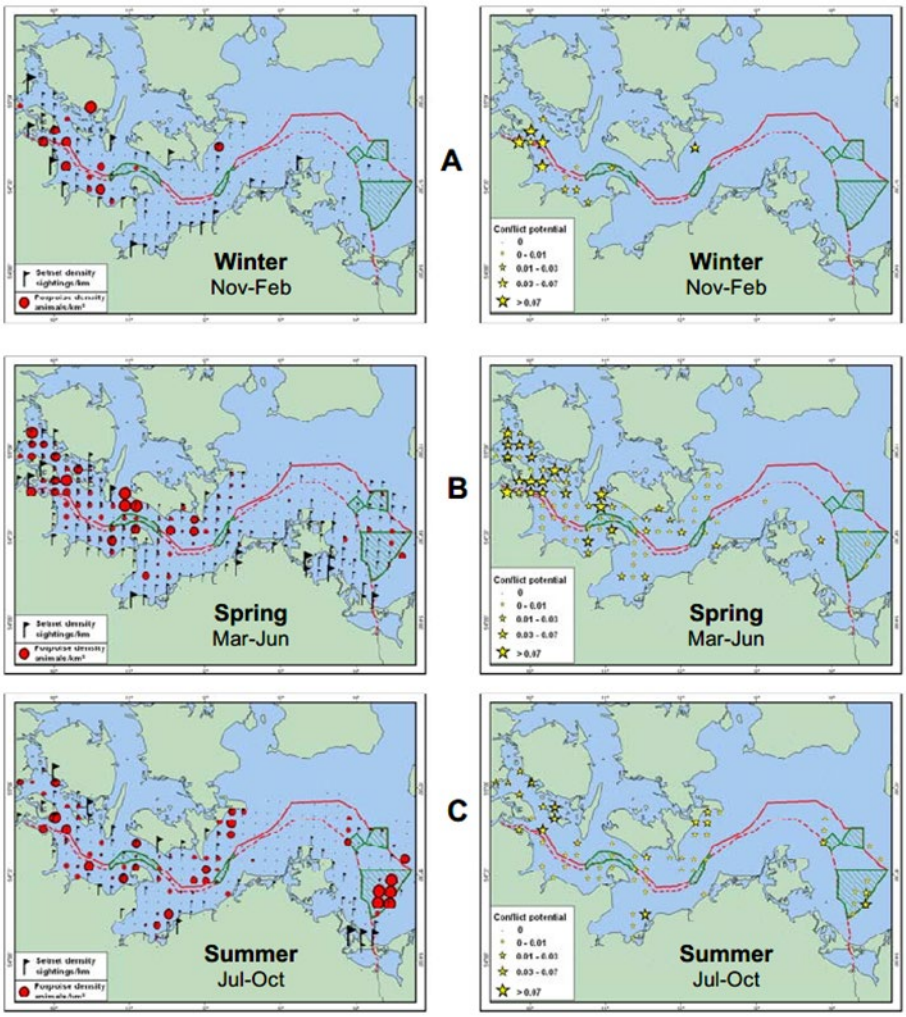

Figure 6: Seasonal overlap of static net fishing activity and presence of harbour porpoises (left) and potential conflict (right) in the southern Baltic Sea – 2002-2006. (After: Sell et al., 2011)

Recent assessments in the context of novel pilot studies also stress the bycatch problem associated with commercial gillnet fisheries in the Belt Sea (ICES SD 22) (Larsen et al., 2021). In this area, fishing effort of the Danish gillnet fleet is consistently high throughout the year, especially in locations in the direct vicinity to the Fehmarn Belt Natura 2000 site. As a result, these also present locations of high bycatch rates for seabirds, harbour porpoises, and seals. In the Belt Sea Area, mean quarterly fleet-wide seabird bycatch rate estimates for Danish commercial gillnetters ranged from 64 to 474 individuals, with an estimated 843 individuals annual mean (Tab. 5 and Annex, Fig. A4). For several of these bycaught seabird species, and given their vulnerable and/or endangered state and protected status (e.g., common scoter), bycatch levels are considered unsustainable (Larsen et al., 2021). Harbour porpoise mean quarterly bycatch estimates ranged from 57 to 201 individuals, with an estimated 493 individuals annual mean (Tab. 5 and Annex, Fig. A4). Seals (grey seal *Halichoerus grypus* and harbour seal *Phoca vitulina*) bycatch estimates ranged from 0 to 103 individuals, with an estimated 125 annual mean (Tab. 5 and Annex, Fig. A4).

Table 5: Mean quarterly fleet-wide bycatch estimates in the Belt Sea in the Danish commercial gill-net fleet between 2010 and 2018.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year
Seabirds	474 (125-1,072)	144 (57-263)	64 (23-117)	159 (80-260)	843 (284-1,720)
Harbour Porpoise	57 (21-100)	145 (95-199)	201 (130-282)	90 (48-144)	493 (294-752)
Seals (Grey & Harbour Seals)	7 (0-21)	15 (0-35)	103 (54-163)	0	125 (54-219)

Source: Larsen et al., 2021. Seabirds: Table 2.5; Harbour porpoise: Table 2.7; Seals: Table 2.9.

Within the framework of the third HELCOM Holistic Assessment of the State of the Baltic Sea (HOLAS), which will be published in October 2023, the indicator "Number of drowned mammals and waterbirds in fishing gear" evaluates the status of the Baltic Sea with regard to bycatch of waterbirds and marine mammals in different sub-basins. The evaluation concluded that the Baltic Sea, where assessed, fails to achieve GES with regard to bycatch of waterbirds and marine mammals (Fig. 7).

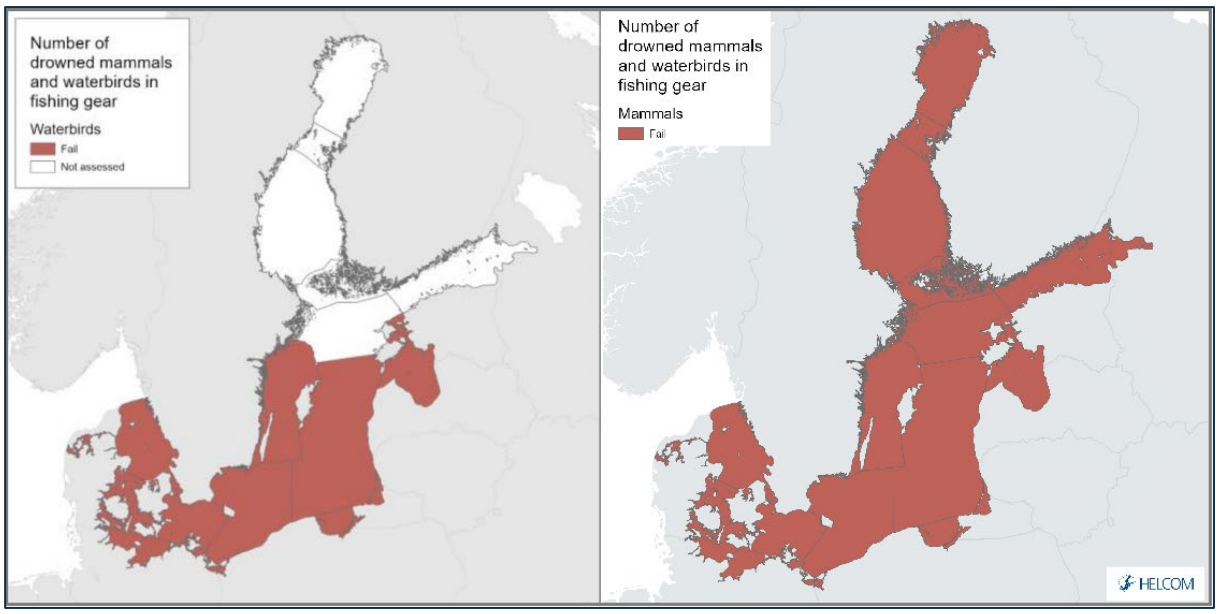

Figure 7: Status evaluation results based on the indicator 'Number of drowned mammals and waterbirds in fishing gear' of the Baltic Sea sub-basins: marine mammals (right) and waterbirds (left). (Source: HELCOM: Number of drowned mammals and waterbirds in fishing gear. HELCOM core indicator report. Online available at: https://indicators.helcom.fi/indicator/bycatch).

In addition to insights on bycatch risk provided from fishing effort indices, data on dead and stranded individual harbour porpoises along the German Baltic coastline are collected within monitoring programmes by the Oceanographic Museum (DMM) and the Institute for Terrestrial and Aquatic Wildlife (ITAW). The data suggest that the number of dead individuals has risen significantly since 2000 (Fig. 8; Dähne et al., 2018, Schick et al., 2021, ASCOBANS, 2021, pers. comm.) Although the exact reasons behind this increase are unknown, rising numbers

should not be falsely attributed to a population increase, but understood in the context of an improved reporting scheme on strandings. In any case, sound bycatch monitoring for SSF would enable establishing the reasons behind this increase in strandings.

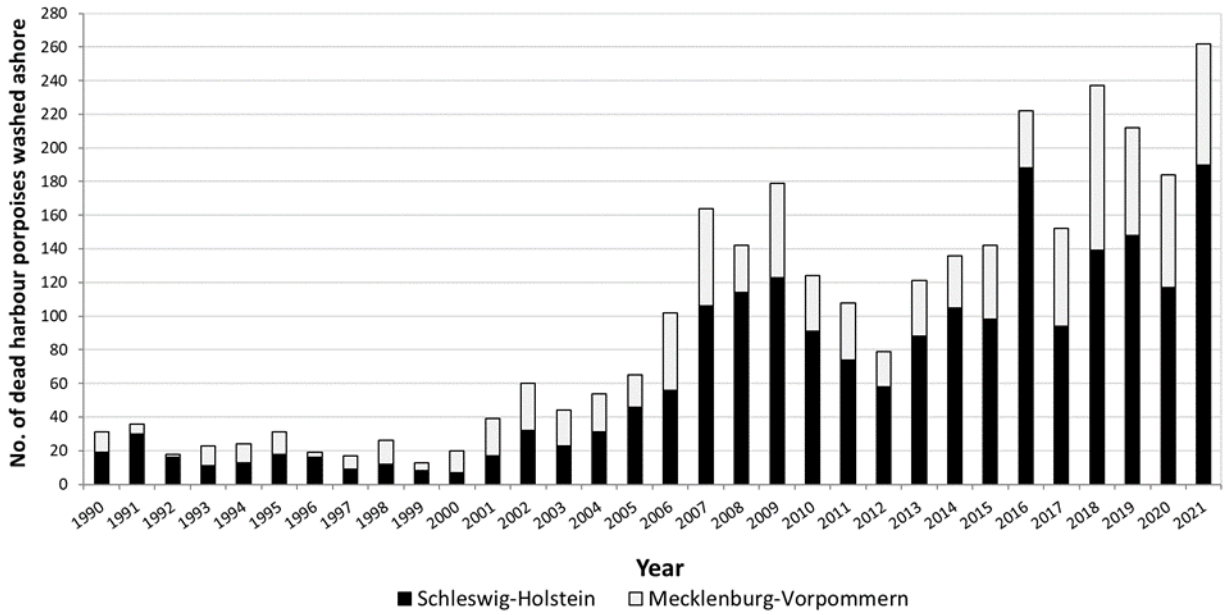

Figure 8: Number of dead harbour porpoises collected along the German Baltic coast from 1990 to 2021. Compilation based on monitoring data collected by the German Oceanographic Museum (DMM) and the Institute for Terrestrial and Aquatic Wildlife (ITAW) for the States of Mecklenburg-Vorpommern and Schleswig Holstein, respectively.

Besides the risk of bycatch during operation, static nets have one of the highest risks of being lost at sea (Richardson et al., 2019). When such gear loss occurs, they can continue to fish indefinitely ("ghost fishing"), perpetuating the risk of target as well as non-target species still being caught. In addition, there also exists the risk that parts of lost fishing gear can be ingested by birds and marine mammals. An estimated 10% of plastic waste in the world's oceans is comprised by ghost fishing gear (Greenpeace, 2019).

In addition to the direct impacts on protected species, static net fisheries can also have pronounced indirect effects on the marine environment, specifically on the abundance of fish stocks, the structure and functioning of food-webs, and the biological diversity of fish communities. The main target fish stocks of static net fisheries in the region (both Western and Eastern Baltic cod stocks and Western Baltic spring spawning herring) are severely depleted or overfished, with most recent scientific advice calling for further cuts in TACs and the closure of the herring fishery (ICES, 2022a; 2022b). Furthermore, herring constitutes a key trophic species, fundamental for the proper functioning of the food web of the Western Baltic Sea. As such, declines in its abundance will have pronounced effects in the diet of species feeding on it, including harbour porpoise (as demonstrated by results of recent (Scotti et al., 2022) assessments). The current poor status of fish stocks will unavoidably hinder the achievement of GES, directly relating to a series of MSFD Descriptors: Biological Diversity (D1), Fisheries (D3), and Food Webs (D4) (German Federal Government, 2018a, b). To that end, the designation of strictly protected areas, including no-take areas, would help enormously to protect the marine environment by allowing the recovery of fish stocks and food webs.

3.3 Other human pressures

When developing management measures for static net fisheries, it should be remembered that other activities exert adverse impacts on protected features. Other human activities with substantial impacts on protected species include shipping and exploration activities (Fig. 9) as well as mobile bottom-contacting fisheries, which are currently not yet regulated in the EEZ (with the exception of a ban on the Odra Bank), although the EU process is ongoing. To that end, management measures for static net fisheries should take into consideration impacts arising from other activities, as well as cumulative impacts from the various activities. For instance, measures such as the use of ADDs (see section 4.3) should consider the fact that other sources of underwater noise (e.g., from construction) may be present and that these may have pronounced impacts on harbour porpoise populations. Marine species are in general experiencing an ever-increasing level of anthropogenic sound, which may have considerable negative impacts on their behaviour, physiology, and auditory systems (Kastelein et al. 2015, Hamilton and Baker 2019). In addition, the impacts of rising sea temperatures (due to climate change) on fish resources and protected species also need to be accounted for. All of these should be taken into account when developing management measures.

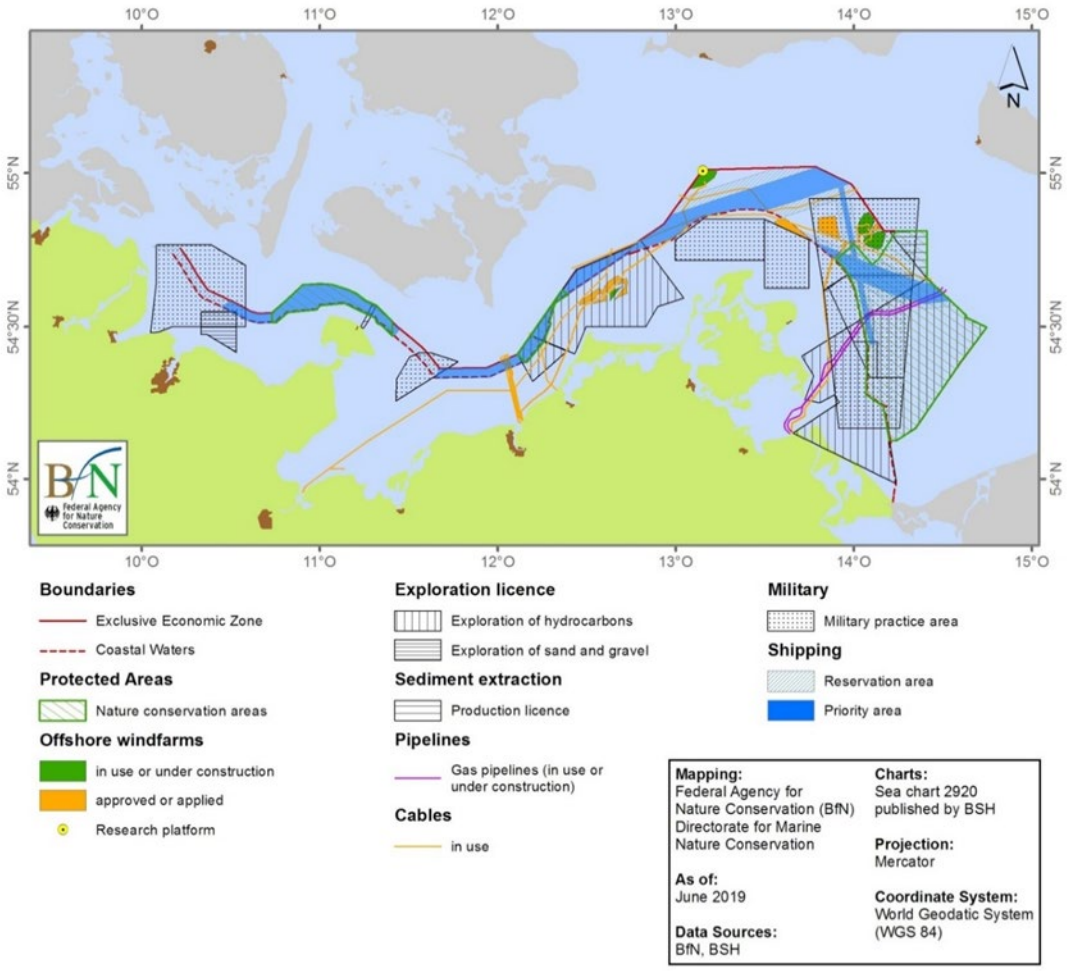

Figure 9: Human activities with the exception of commercial fishing in the German Baltic EEZ. (Source: Draft JR for mobile bottom-contacting fishing gear)

4 Management and mitigation measures

4.1 Towards an ecosystem-based approach to fisheries management

In view of the negative impacts of static net fisheries on the harbour porpoise and seabird populations, as well as the poor conservation status of several species, there is an urgent need to reduce bycatch. To that end, measures are required throughout protected species' distribution ranges in order to ensure spatial links and enable functional connectivity. This could also aid the prevention of negative impacts arising from the potential displacement of fishing activities, especially in the direct vicinity of the sites. The highly mobile harbour porpoises require protection from being bycaught in their whole distribution range. For seabirds, protection against bycatch is crucial in their reproduction, wintering, feeding, resting, and moulting areas.

As such, relevant measures for the management of static net fisheries need to be taken both inside and outside Natura 2000 sites in the German Baltic EEZ. This can be achieved with a step-wise approach, outlined in the following Chapters, for shifting to alternative gear with reduced bycatch risk (e.g., pots and traps), coupled with incentives provided to fishers. It is also important to establish an effective monitoring, control and enforcement framework to ensure compliance with and sound monitoring of the effectiveness of management measures (see Ch. 5).

In the longer-term, however, there is a need for a fundamental change in Baltic Sea fisheries. A shift away from static nets to more environmentally friendly forms of fishing is necessary to reach the goal of zero bycatch of protected species, as recommended by ICES (2020a; 2020b), ASCOBANS, and HELCOM.

Table 6 provides an overview of common measures for minimizing adverse environmental impacts from static net fisheries and, subsequently, conflicts with conservation objectives. The strengths and limitations of such measures are reviewed in particular regarding their applicability in German Baltic EEZ. This review enables establishment of the most effective measures in reducing and ultimately eliminating bycatch in static net fisheries in the German Baltic EEZ.

Among the measures presented in Table 6, certain ones are more effective in promoting the strategic shift towards sustainable fisheries and should therefore be prioritized. These include the establishment of no-take zones and spatio-temporal closures, as well as the shift to alternative fishing gears. Other measures, notably the use of ADDs, could be helpful in reducing negative impacts of static net fisheries on protected species while the rebuilding process is advancing, but should constitute an interim measure, namely temporary and only applicable outside MPAs (i.e., NCAs/NSGs) due to emitting additional underwater noise.

Table 6: Overview of management and mitigation measures for minimizing conflicts between static net fisheries and conservation objectives.

Measure	Description	Strengths	Limitations
No-take-zones	Areas in which all forms of fishing are prohibited	• High protection for species and habitats from impacts of fishing, incl. bycatch / safe retreats • Widely tested and effective • Improve food availability for HP* and sea-birds • Easy to control by the use of VMS, logbooks, and observers • Can generate spill-over effects for commercial fish species	• Could result in the displacement and increase in fishing effort in the direct vicinity of the zone
Closed areas for specific gear (spatial and temporal zoning)	Exclusion of specific gear types which are in conflict with conservation targets in defined areas. Depending on the purpose, a closure can be temporary or all year round; different zones can be established.	• Widely tested and effective measure • Easy to control by VMS, logbook, and observers • Would create the incentive to shift from static nets to alternative gears (e.g., pots and traps) to continue fishing within the same fishing grounds	• Could result in the displacement and increase in fishing effort in the direct vicinity of the zone
Technically modified static net gear	Technical modifications of static nets (e.g., acoustic passive reflectors) that enhance detectability for echo-locating mammals or modifications (e.g., light, flags, moving eyes, predator-shaped kites) that prevent bird bycatch.	• Acrylic glass spheres attached on gillnets at fixed intervals (“pearl nets”) possibly reducing bycatch of HP (STELLA) • No noise pollution by such spheres	• Further testing necessary (combination with PALs; STELLA; STELLA II projects) • No industrial production of such nets yet possible (STELLA II) • No technical modifications found yet that reliably prevent bird bycatch (research conducted in BfN funded UNCATCH project)

Table 6 – Continuation

Measure	Description	Strengths	Limitations
Acoustic deterrent devices (ADDs)	Pingers produce signals that scare porpoises away from nets. PALs** produce alert signals that improve the echo-location ability of porpoises, presumably leading to better detection of nets.	• Reduction in HP bycatch	• No elimination of HP bycatch (bycatch rates are reduced by ca. 50 – 80 % by pingers) • Only effective for HP, not for sea birds • Additional noise has negative impacts on species and habitat quality, not desirable inside MPAs and in the long term • Effectiveness of PALs not widely tested, further testing needed (PAL-CE project) • PALs cannot be used in the central Baltic, as they have only been tested for the western HP population.
Alternative gear	Alternatives to static nets that do not cause or substantially reduce bycatch risk of marine mammals and birds such as traps or pots.	• Substantial reduction in HP and bird bycatch • Prevent feeding of seals on the caught fish	• Fishing might not be as effective for target fish as static nets • More space needed on boats • Profound change for fishers • Further testing and research needed (STELLA; STELLA II)

* HP: Harbour porpoise; ** PALs: Porpoise Alerting Devices

4.2 Proposed fisheries management measures inside Natura 2000 sites

To safeguard protected species and allow for the recovery of their populations, particularly in areas that constitute key habitats, the following measures for the management of fisheries are suggested, with a focus on static net fisheries:

Measure 1 (M1): Year-round exclusion of static net fisheries in all Natura 2000 sites in the German Baltic EEZ

Measure 2 (M2): Establishment of a no-take zone in part of Pomeranian Bay SPA (Odra Bank)

Rationale

An exclusion of static nets (M1) (Tab. 7; Fig. 9) is necessary in all protected areas and is substantiated from the spatio-temporal distribution patterns of both seabirds and harbour porpoises. For all of the Natura 2000 sites in the German Baltic EEZ, harbour porpoise occurrence is documented all year round (Sell et al., 2011, Benke at al., 2014) and its conservation is explicitly addressed in the Natura 2000 sites fact sheets and respective NCA regulations. Seabirds are especially protected in Pomeranian Bay SPA. Strict protection of the threatened species can only be established if bycatch is prevented in areas which should act as refuges, allowing the recovery of populations. Therefore, static nets need to be excluded from MPAs. The use of ADDs should not be allowed inside Natura 2000 sites to prevent deterioration of the habitat through noise pollution and a resulting risk of habitat displacement for harbour porpoise.

In addition to the environmental benefits for the protected species, the proposed no-take-zone in the Odra Bank (M2) (Tab. 7; Fig. 9) will also promote the recovery of fish stocks on which harbour porpoises and seabirds largely depend as food source (Andreasen et al., 2017; Scotti et al., 2022). Closures are considered beneficial for cod stocks (ICES, 2019, p.12) and are likely to result in higher yields for fisheries outside the MPAs in the long-run.

With respect to effects on the fishery, an exclusion of static net fisheries from Pomeranian Bay SPA and the SACs of Western Rønne Bank, Adler Ground and Pomeranian Bay with Odra Bank could lead to a relocation of fishing effort of German and Polish vessels to neighbouring areas. In effect, that could create zones of higher concentration of fishing effort around the borders of the Natura 2000 site, but, due to the large size of the area and the comparatively low fishery effort, the effect is thought to be small and not of a substantial impact on the environment. Nonetheless, protecting neighbouring coastal Natura 2000 sites (such as Greifswalder Boddenrandschwelle und Teile der Pommerschen Bucht) is recommended and in line with ICES advice (2020a; d). To keep the relocation effect as small as possible, the introduction of alternative fishing methods is of high importance.

Proposed measures are in line with key policies (MSFD; EU Biodiversity Strategy, EUCOM, 2020a) which stress the need for strict protection (see Section 1.2). Major provisions stemming from these policies dictate that strict protection is necessary for the following reasons: (i) to create spatially and temporally adequate retreat and resting areas (Environmental Goal 3.1 of MSFD-BLANO); (ii) to ensure the structure, functioning, and/or regeneration of food webs (Environmental Goal 3.2 of MSFD-BLANO); and (iii) to serve as reference areas (re-

cital 38 MSFD, descriptors 4 – food webs, 1 – biodiversity, 6 – sea floor integrity). Strictly protected areas have been described by the European Commission[20] as areas in which natural processes are left virtually undisturbed by human pressures and threats and will often result in non-intervention areas.

Table 7 summarizes existing and previously proposed measures for each individual Natura 2000 site in the German Baltic EEZ, alongside the ones suggested in the present document for static net fisheries. Figure 10 depicts the proposed fisheries management measures within each Natura 2000 site in the German Baltic EEZ.

Table 7: Fisheries management measures in Natura 2000 sites in the German Baltic EEZ.

Natura 2000 site	Existing and previously proposed measures	Proposed measures for static net fisheries	Rationale of proposed measures
Fehmarn Belt SAC	Existing: n/a Proposed: No fishing with mobile, bottom-contacting gear in a management zone	**M1** – Year-round exclusion of all static net fisheries	Protection of HP. Year-round occurrence of HP* (Belt Sea population)
Kadet Trench SAC	Existing: n/a Proposed: No fishing with mobile, bottom-contacting gear in a management zone	**M1** – Year-round exclusion of all static net fisheries	Protection of HP. Year-round occurrence of HP (Belt Sea population)
Western Rønne Bank SAC	Existing: Exclusion of static nets from Nov – Jan. Proposed: No fishing with mobile, bottom-contacting gear	**M1** – Year-round exclusion of all static net fisheries	Protection of HP. Year-round occurrence of HP (**winter**: Baltic Proper population, **summer**: Belt Sea population)
Adler Ground SAC	Existing: Exclusion of static nets from Nov – Jan. Proposed: No fishing with mobile, bottom-contacting gear	**M1** – Year-round exclusion of all static net fisheries	Protection of HP. Year-round occurrence of HP (**winter**: Baltic Proper population, **summer**: Belt Sea population)
Pomeranian Bay with Odra Bank SAC	Existing: Prohibition of active gear in parts of the Odra Bank; Exclusion of static nets from Nov – Jan. Proposed: No fishing with mobile bottom-contacting gear on Odra Bank.	**M1 –** Year-round exclusion of all static net fisheries, **M2 –** No take zone on Odra Bank – expand ban of active gear to all types of fishing gear	Protection of HP. Year-round occurrence of HP (**winter**: Baltic Proper population, **summer**: Belt Sea population). Recovery of habitats and food webs.
Pomeranian Bay SPA	Existing: Prohibition of active gear in parts of the Odra Bank; Exclusion of static nets from Nov – Jan. Proposed: No fishing with mobile bottom-contacting gear on Odra Bank.	**M1 –** Year-round exclusion of all static net fisheries, **M2** – No take zone on Odra Bank – expand ban of active gear to all types of fishing gear	Protection of sea birds. Winter (resting, feeding) and summer (moulting). Recovery of habitats and food webs.

*HP: Harbour porpoise

[20]SWD (2022) 23 final: Commission Staff Working Document - Criteria and guidance for protected areas designation from 28.01.2022

The suggested measures M1 and M2 need to be established according to Articles 11 and 18 of the CFP and will complement (i) the existing measure for the prohibition of active gear fisheries in parts of the Odra Bank (EU Council, 1997), (ii) the three-month closure of static nets in the Pomeranian Bay established under BALTFISH (EU Regulation 2022/303), and (iii) measures previously proposed for the exclusion of mobile, bottom-contacting gear fisheries within all Natura 2000 sites in the German Baltic EEZ.

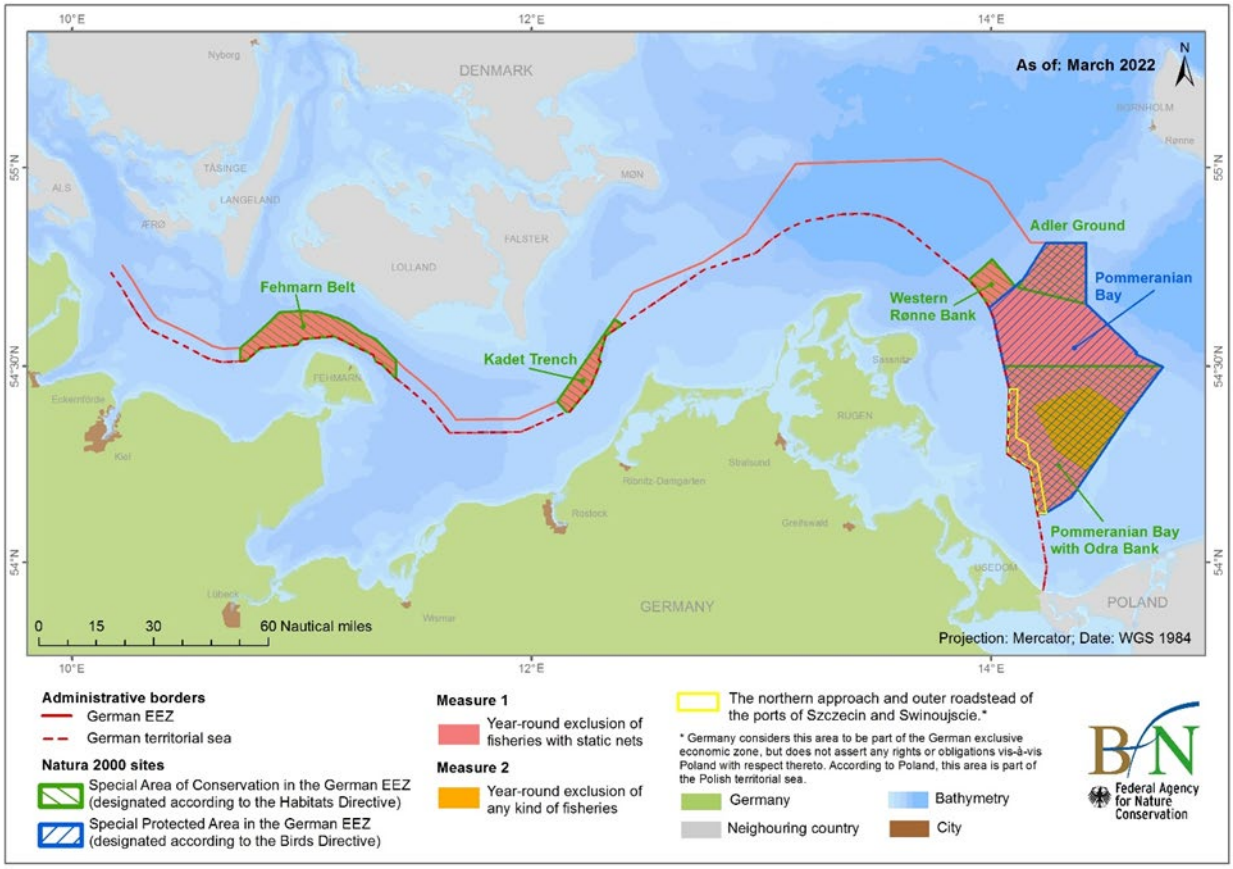

Figure 10: Proposed fisheries management measures within Natura 2000 sites in the German Baltic EEZ.

The proposed management measures are largely based on a set of previously suggested measures for the protection of seabirds against bycatch in static net fisheries (Sell et al., 2011) in combination with the recent discussions and recommendation with regard to harbour porpoise protection. The previously proposed measures with regard only to seabirds, co-developed and agreed upon both by the TI and the BfN, included: (i) yearly closure of static net fisheries for the largest southern part of Pomeranian Bay SPA; (ii) seasonal closure (1.12 – 30.04 and 1.06 – 31.10) for static net fisheries in a second area north of it (Graben); and (iii) seasonal closure (1.11 – 30.4) for static net fisheries in the area that encompasses a large extent of Adler Ground SAC (see Annex, Fig. A5).

Appropriateness of measures

Within the framework of EU legislation, when developing management measures, it is a prerequisite that such measures are “appropriate”. “Appropriateness” is frequently understood as measures being efficient and proportional. The principle of proportionality, a key principle of EU legislation (Article 5 of the Treaty of EU; also fundamental in the CFP), requires that the

implementation of relevant Regulations does not go beyond what is necessary to achieve their goal. In the case of developing management measures for static net fisheries, measures being appropriate would imply that any direct, short-term negative impact on the fishery should be as small as possible and that measures are implemented that produce maximum conservation impact with minimum impact on the fishery.

It is highly likely that the proposed measures will have direct short-term impacts on the static net fisheries in the area. However, the imminent risk of the extinction of the Baltic Proper harbour porpoise presents a very intense and long-lasting threat to the ecosystem. Further declines in the harbour porpoise and other protected species population levels could eventually lead to more stringent measures than the ones suggested here (e.g., within the context of the MSFD; one-out-all-out principle) that would have an even more dramatic impact on fisheries in the area. It is indispensable to follow the precautionary principle due to the fact that no effective monitoring of bycatch is in place. In addition, the fisheries also have the option to change fishing methods so that they can continue their operations. To that end, measures should go hand-in-hand with incentives provided to those fishers who will shift to more environmentally friendly gear.

4.3 Proposed management measures outside Natura 2000 sites

To protect harbour porpoises in their entire population range, the following management measure is suggested outside Natura 2000 Sites.

Measure 3 (M3): Interim mandatory use of Acoustic Deterrent Devices (ADDs) on static nets in all areas outside Natura 2000 sites for a maximum of 5 years

Only ADDs which have been thoroughly tested and proven to unambiguously reduce bycatch should be used for implementing this measure. ADD use should also be accompanied by further research (c/f Ch. 4.4) and an effective monitoring scheme (c/f Ch. 5). This is especially necessary for the use of Porpoise Alert Devices (PALs), such as those currently being used on a voluntary basis in the Schleswig Holstein coastal fishery [21].

Rationale

As mentioned above, the conservation needs of the highly mobile and highly endangered harbour porpoise expand to the whole range of the species' distribution. Therefore, it is also necessary to mitigate the bycatch risk of static nets outside Natura 2000 sites. The most effective solution would be to only allow alternative fishing gear with lower or minimal bycatch risk. However, since alternative gear have not yet been improved to the extent of replacing static gear (e.g., with regard to fishing efficiency and handling), static nets should only be employed in German waters outside Natura 2000 sites when accompanied with ADDs. Since pingers have been shown to reduce bycatch in operational fisheries (Orphanides and Palka, 2013), it is expected that bycatch will be significantly reduced by applying this mitigation measure.

However, the use of ADDs should be limited to a maximum of five years because pingers can have adverse effects and acoustic disturbance needs to be taken into consideration. Past studies have suggested that certain pingers may cause temporary habitat displacement and might

[21] https://ostseeinfocenter.de/mitmachen/freiwillige-vereinbarung/

affect foraging efficiency. At the same time, certain harbour porpoise individuals became progressively more tolerant to certain pinger sounds, suggesting habituation to their effect (Cox et al. 2001, Kyhn et al., 2015, Kindt-Larsen et al., 2019). In addition, it should be noted that pingers do not eliminate bycatch of harbour porpoise completely. There are also differences between the effectiveness of different types of pingers (e.g., 10 kHz analogue vs. digital wide band sweeps).

Therefore, the use of ADDs can only be an interim measure as stated in the Jastarnia Plan (ASCOBANS 2016), while research into and a shift to alternative fishing methods should be pursued at the same time. This measure, in combination with Measure 1, can thereby be regarded as an incentive for fishers to develop alternative fishing methods or to participate in their development. If ADDs can currently not be considered due to concerns with regard to defence, efforts to replace static nets with alternative gears that do not hold the risk to bycatch protected species even need to be further intensified.

Appropriateness of measures

The use of pingers on bottom set gillnets or entangling nets is already mandatory in ICES SD 24 for boats >12 m (EU 2019/1241). However, since the greater part of the fleet is small scale, this measure needs to be extended to all vessels using static nets regardless of size and to the whole German EEZ. Pingers can reduce bycatch to a great extent, while their application does not hamper fishing operations.

Nonetheless, there are also disadvantages connected to pinger use from the management perspective: training for fishers, purchase and maintenance of the devices, control and enforcement are obstacles. The European Maritime, Fisheries and Aquaculture Fund (EMFAF) should cover expenses for pinger deployment and for monitoring.

4.4 Proposed accompanying research activities

It is essential to complement the proposed management measures with supporting research activities to allow their effective implementation and to accomplish the overarching aims of a shift to alternative gear and bycatch mitigation. Trustful cooperation with the fisheries sector as well as providing financial incentives is thereby the key for success.

Research item 1: Alternative gear and gear modifications

The development of alternative gear and gear modifications that do not cause bycatch of protected species should be a research priority. Fisheries will only shift to alterative, more environmentally friendly types of fishing when such gear becomes a commercially viable alternative (especially when compared to the low cost of static nets), or when provided with incentives such as preferential access to fishing grounds. Alternative gear could serve as a sustainable long-term perspective for the fisheries sector and should be the focus for future research. For this reason, the BfN is continuing research on the topic in the context of the project STELLA (II) in which modified nets (e.g., acoustic passive reflectors such as acrylic glass spheres; “pearl” nets) and alternative gear (pots, pontoon traps) are being developed and tested. The BfN has also started a new project on gear modifications for bird bycatch reduction. As an incentive for switching to alternative gear, gear documented as not posing a risk of bycatch could be allowed within Natura 2000 sites, provided their use is in accordance with the conservation objectives of the area.

Research item 2: Systematic review of the effect and effectiveness of Acoustic Deterrent Devices

Pingers

The wide-scale application of pingers as an interim measure should be supported by a monitoring programme that assesses impacts from their deployment on harbour porpoises and the effectiveness of the devices. There is also speculation that certain pingers in gillnet fisheries may affect target and non-target fish species (Goetz et al. 2015; Kastelein et al. 2006; Hamilton and Baker, 2019). The BfN therefore supports research activities investigating the effects of pinger sounds on harbour porpoises and their behaviour, as well as their effectiveness in reducing bycatch.

Porpoise Alerting Devices (PALs)

The assessment of the impacts of a wide-scale application of ADDs is especially necessary for the use of PALs, which are already broadly in use in waters off Schleswig-Holstein (c/f footnote above no. 21). Although PALs have been shown to decrease bycatch of harbour porpoises from the Belt Sea population (Chladek et al. 2020), the effects on the behaviour of the animals remains unknown as well as the effectiveness of these measure on animals from other populations. PALs are an additional source of noise, which increases acoustic stress for the animals in a cumulative manner.

Research item 3: Research on willingness of fishers to shift to alternative and/or modified gear and the role of incentives

A trustful cooperation with the fisheries sector is of utmost importance for the success of conservation measures and for changes towards sustainable practices. Therefore, research is needed on the willingness of fishers to use alternative and/or modified fishing gear and on the role of tools such as financial incentives to promote transition to sustainable fishing. One option that needs to be investigated is the valorization of sustainable practices through the allocation of higher quotas and, thereby, the support of low-impact fisheries. Ongoing research and support of fishers' initiatives that actively engage in the transition to sustainable fishing should be continued and expanded. Ecolabelling and the development of local markets (direct marketing) could be incentives for good environmental practices. Further alternatives towards sustainability could be diversification of target species and support for the diversification of livelihoods (e.g. fishers could collect data on fish stocks or work as guides in MPAs).

5 Monitoring, control and enforcement

For the effective implementation of suggested measures and overall management of Natura 2000 sites it is crucial to have in place a system for monitoring fishing activity and bycatch of protected species in static net fisheries. Proposed monitoring, control, and enforcement measures are described below, while reference – within brackets – is made to sources that have suggested such measures in the past. Further, new monitoring requirements may emerge with the ongoing revision of the EU Control Regulation (EU Regulation 1224/2009) that can support the proposed monitoring measures.

1. Reporting of fine-scale spatiotemporal fishing effort information for all static net vessels, including vessels <12 m (ICES, 2020a; HELCOM Roadmap, 2020) AND Monitoring the response of the fishery to the implementation of the suggested measures

Such reporting should be mandatory (as in the case of larger-size vessels) and include information on the exact geographical position of gear deployment (geographic coordinates), net length, net drop, and immersion time of each fishing operation (area x duration in hours). For vessels <12 m Automatic Identification Systems (AIS) would be an alternative option to VMS, with relevant systems already in place as control instruments in Swedish marine Natura 2000 sites (e.g., Fladen[22]); for vessels <8 m, viable options could include the use of AIS or mobile position logging systems.

In other countries (Sweden) in the Baltic, SSF vessels <12 m are required to report the exact coordinates of their gear deployment in addition to the ICES Rectangle and Subdivision. These also include vessels <10 m that report relevant information on a monthly basis (Natale et al., 2015; ICES, 2020a). This practice can also be implemented in the German Baltic EEZ and would not require substantial effort and capital investments from the side of the fishers. Mobile position logging systems are becoming increasingly available and can be used for fisheries monitoring purposes. Such systems are especially practical for SSF vessels, where financial constraints may not permit investment in AIS or VMS systems. Such is the case of the "Mofi" Mobile fisheries log app, developed by the TI within the context of the STELLA project funded by BfN/BMU, which is free to use and user-friendly. Interestingly, the app is being trialled by fishers' associations in other countries (Netherlands), with financial support provided for its implementation by the MSC[23]. Funding for the implementation of such systems could also come from the European Maritime, Fisheries and Aquaculture Fund (EMFAF).

Importantly, such monitoring would enable assessment of the response of the static net fishery to the proposed management measures. Since the implementation of the management measures can lead to the displacement and redistribution of fishing effort outside Natura 2000 Sites, it is important to monitor the response of the fishing fleet. If displacement leads to adverse environmental impacts that counteract the purpose of the management measures, adaptive management measures can be applied.

[22] Draft JR on Fisheries Conservation Measures under Article 11 of Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the CFP in the MPAs of Fladen, Lilla Middelgrund, Stora Middelgrund och Röde bank, and Morups bank in the Kattegat

[23] https://www.msc.org/what-we-are-doing/our-collective-impact/ocean-stewardship-fund/impact-projects/smartphone-apps-helping-species

2. Introduction of Remote Electronic Monitoring (REM) systems on a representative number of vessels to record bycatch (ICES, 2020a)

CCTV should be implemented across all vessel size classes, including vessels <12 m. The use of CCTV would enable accurate monitoring of the bycatch of birds and marine mammals in line with the provisions of the Habitats and Birds Directives and the MSFD. This could also take place in parallel to the required monitoring of fish discards in the framework of the landings' obligation (CFP). EM tools have been trialled within the context of relevant assessments in neighbouring countries and have proved particularly efficient in providing estimates of bycatch rates of the gillnet fleet and, as such, locations of high bycatch risk (see: Larsen et al., 2021).

3. Marine mammal observers' system to record bycatch

Dedicated marine mammal observers (STECF, 2019, p.26) are also needed to cover the operations of static net fisheries. Observer coverage needs to improve to a degree that enables monitoring of a representative unit of static net fishing vessels ("reference fleet"), with a focus on areas where there is a high probability of occurrence of harbour porpoise and/or bird species. In this way, areas with a high risk of bycatch would be covered, including in the immediate vicinity of the suggested closures. This measure would support the previous measure on bycatch monitoring with REM. However, it has to be considered that very small boats (<10 m length) might not be appropriate to participate in the system as their size could be too small to take an additional person on board. To that end, observers could be positioned on a representative unit of the larger vessels of the small-scale fleet, i.e. 10-12 m.

4. Monitoring of the effectiveness the measures

The effectiveness and progress of the proposed management measures needs to be evaluated by assessing changes in the conservation status of the (previously) bycaught species and relating it to changes in fishing effort, fishing pattern, and distribution. Progress should be evaluated at regular intervals, for example in line with MSFD reporting cycles and when new knowledge on the status of protected species becomes available, in order to adapt changes if necessary (e.g., regarding pinger use).

5. Long-term acoustic monitoring of harbour porpoise in the Pomeranian Bay (ICES, 2020a)

This would enable a review of changes in the abundance/distribution of harbour porpoises and the species' responses to the measures, for instance those relating to ADDs. The planned follow-up of the SAMBAH project could contribute to improving the data base.

6. Control of the continuous use and functionality of Acoustic Deterrence Devices

Control of the correct use and functionality of ADDs is important. ADDs need to be functional while nets are in the water during the whole fishing operation, not only when nets are set, according to the provisions of the European Commission Implementing Regulation (EU) 2020/967. In order to allow effective enforcement during inspections, continuous and proper monitoring of the functioning of pingers with hydrophones is necessary.

7. Landing and reporting of each bird species bycaught (Pusch and Pedersen, 2010)

Information on bycatch needs to be recorded in logbooks; regarding birds, the reporting needs to be in terms of individuals and not simply weight.

8. Necropsy and sampling of stranded and bycaught harbour porpoises (ICES, 2020a)

Sampling of bycaught/stranded harbour porpoises that are in relatively good enough condition for studies of health (e.g., pollutants, reproductive parameters, etc.) to enable estimates on anthropogenic mortality limits. These already established programmes, conducted by DMM and ITAW (c/f Ch. 3.2), should be proceeded and adopted to the requirements.

6 Roadmap for implementation of management measures

In light of the urgent need for effective management of static net fisheries to protect endangered species, as also recognized in relevant commitments included in the Coalition Agreement 2021, the following roadmap is proposed, presenting major steps in the process (Tab. 8). Since this process has to follow the steps according to Articles 11 and 18 of the CFP, a delegated act could comprise the overarching goal.

Table 8: Proposed roadmap for the implementation of fisheries management measures for static nets in the German Baltic EEZ and sequence of steps

Steps to be taken / Milestones
1. National Consultations regarding management of static nets in all Natura 2000 sites of the German Baltic Sea EEZ
2. National agreement of fisheries management, monitoring, and control measures to protect harbour porpoises and seabirds in all Natura 2000 sites of the German Baltic Sea EEZ
3. Pre-consultations with other Member States with direct management interests in the area, with the aim of agreeing that sufficient information has been provided
4. Formulation of a draft JR (Art. 11 CFP)
5. Negotiations in the framework of regional cooperation following Art. 11 and 18 of the CFP at a technical level
6. Submission of a draft JR to Member States and the Baltic Sea Advisory Council (BSAC)
7. Agreement in the BALTFISH High Level Group to JR within six months of provision of sufficient information
8. Submission of the JR to EU COM
9. Adoption of measures as a delegated act by EU COM - three month after submission of the JR
10. Objection period - two months (Council, European Parliament)
11. Delegated Act to enter into force

7 Outlook

Static net fisheries is one of numerous anthropogenic activities in the German Baltic Sea that has a severe impact on protected species. With an ever-increasing demand for marine space and the intensity of maritime activities, safeguarding protected species and their habitats should constitute priorities for each individual maritime sector, but also in the context of holistic, integrated marine spatial planning. Thus, effective regulation of static net fisheries is of crucial importance for the successful protection of marine biodiversity.

The proposed management measures will result in the immediate reduction of the risk of bycatch of seabirds and marine mammals, with obvious added advantages for the entire ecosystem (food webs, fish stocks, habitats). If these measures are not implemented in a timely manner, as described in the roadmap, there is a high risk of irreversible damage to protected species, in particular the imminent risk of extinction for the Baltic Proper harbour porpoise population. The proposed measures are also appropriate for ensuring long-term sustainability of passive fisheries with a vision of a sustainable fishery which goes along with the achievement of conservation objectives.

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List of acronyms and abbreviations

Abbreviation	Explanation
ADD(s)	Acoustic Deterrent Device(s)
AIS	Automatic Identification System
BALTFISH	Baltic Sea regional fisheries body
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas
BSAC	Baltic Sea Advisory Council
CCTV	Closed-circuit Television
CFP	Common Fisheries Policy
DMM	Deutsches Meeresmuseum; German Oceanographic Museum
EEZ	Exclusive Economic Zone
EMFAF	European Maritime, Fisheries and Aquaculture Fund
EUCOM	European Commission
GES	Good Environmental Status
JR	Joint Recommendation
HELCOM	Helsinki Convention - Convention on the Protection of the Marine Environment of the Baltic Sea Area
ICES	International Council for the Exploration of the Sea
ITAW	Institute for Terrestrial and Aquatic Wildlife
MSFD	Marine Strategy Framework Directive
NCA	Nature Conservation Area (NSG: Naturschutzgebiete)
PAL(s)	Porpoise Alerting Device(s)
REM	Remote Electronic Monitoring
SAC	Special Area of Conservation
SCI	Site of Community Importance
SSF	Small-Scale Fishery
SPA	Special Protection Area
STECF	Scientific, Technical and Economic Committee for Fisheries

TAC	Total Allowable Catch
TI	Thünen Institute
VMS	Vessel Monitoring System

A Annex

Table A 1: Key measures for the management of static net fisheries in the German Baltic Sea.

Policy	Key provisions relevant for static net fisheries
EU 2019/1241 Technical measures Regulation	• Minimum conservation reference sizes for key commercial species in SDs 22-32 (e.g., cod: 35 cm; plaice: 25 cm; flounder in SD22-25: 23 cm) (Annex VIII) • Baseline mesh sizes for vessels using static nets: at least 110 mm (ibid). • The use of gillnets, entangling nets or trammel nets of more than 9 km for vessels <12 m and 21 km for vessels >12 m shall be prohibited (ibid). • The maximum immersion time for such gear shall be 48 hours, except when fishing under ice cover (ibid) • Vessels ≥12 m deploying any bottom set gill net or entangling net shall be prohibited to fish within ICES SD24 without the simultaneous use of ADDs (Annex XIII) • Prohibition of fishing with static nets between 1 November and 31 January in the Natura 2000 sites of Adlergrund, Westliche Rönnebank, Pommersche Bucht mit Oderbank, Pommersche Bucht, and Greifswalder Boddenrandschwelle und Teile der Pommerschen Bucht (coastal sea) from November to January. (Annex XIII)
EU Council Regulation 2021/1888 fixing for 2022 the fishing opportunities for certain fish stocks and groups of fish stocks applicable in the Baltic Sea	• Total Allowable Catches (TACs) and allocations for Baltic Sea EU Member States. for: - Cod (*Gadus morhua*) - Herring (*Clupea harengus*) - Plaice (*Pleuronectes platessa*) • Temporal closure for cod fisheries in SD22 (15.1-31.3) and SD24 (15.5-15.8) • Measures on recreational fisheries of cod and salmon in SDs 22, 24

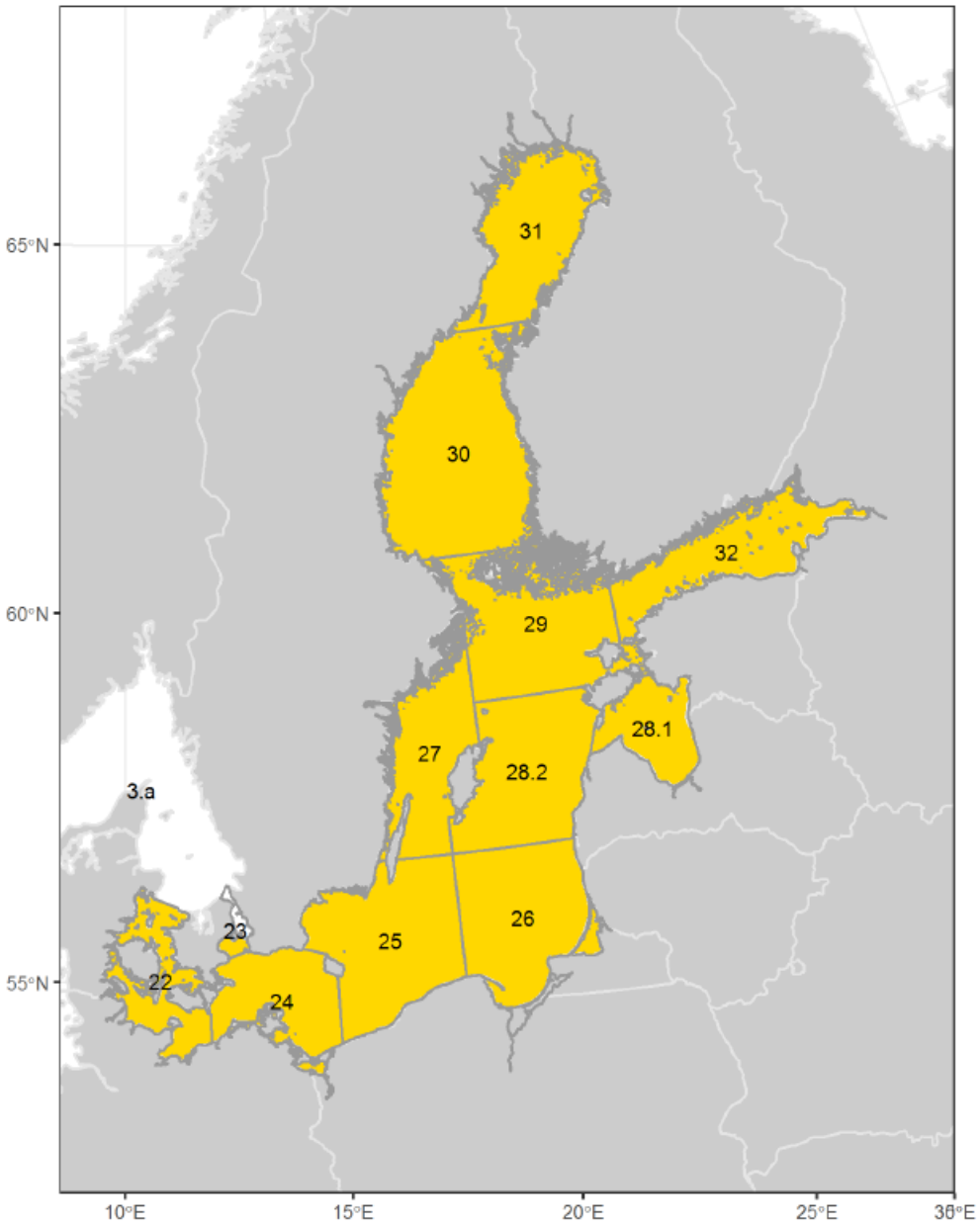

Figure A 1: Baltic Sea ecoregion with ICES Subdivisions (SDs) (Reproduced with permission from ICES, 2019).

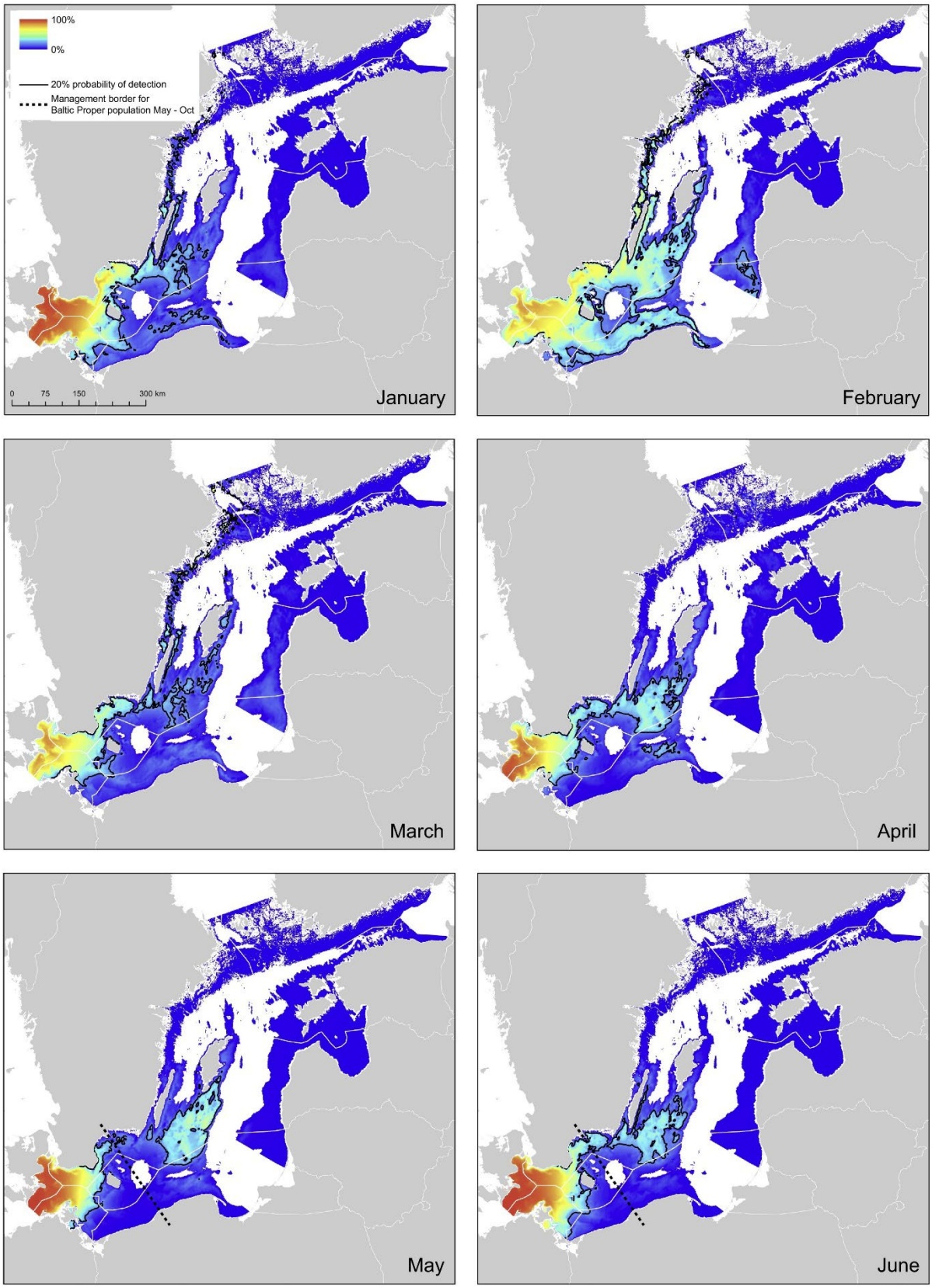

Figure A 2: Predicted monthly probability of detection of harbour porpoises in the study area (the Baltic Sea), for each month January–December. The probability scale is the same in all figures. The black lines indicate 20% probability of detection. The dotted line shown for May–October is the seasonal management border proposed for the Baltic Proper population. (Reprinted from Carlen et al., 2018 with permission from Elsevier)

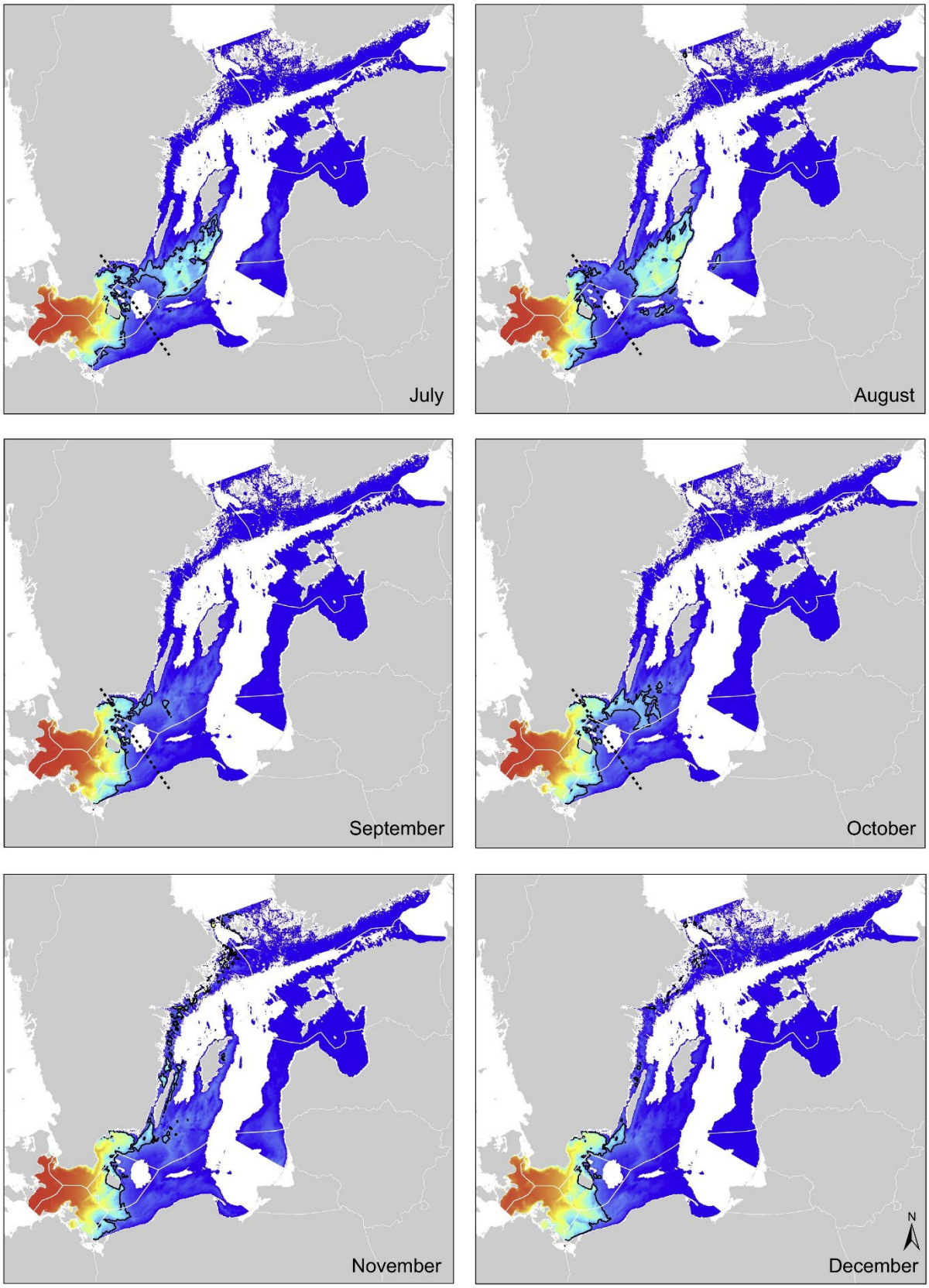

Figure A 2: Continued

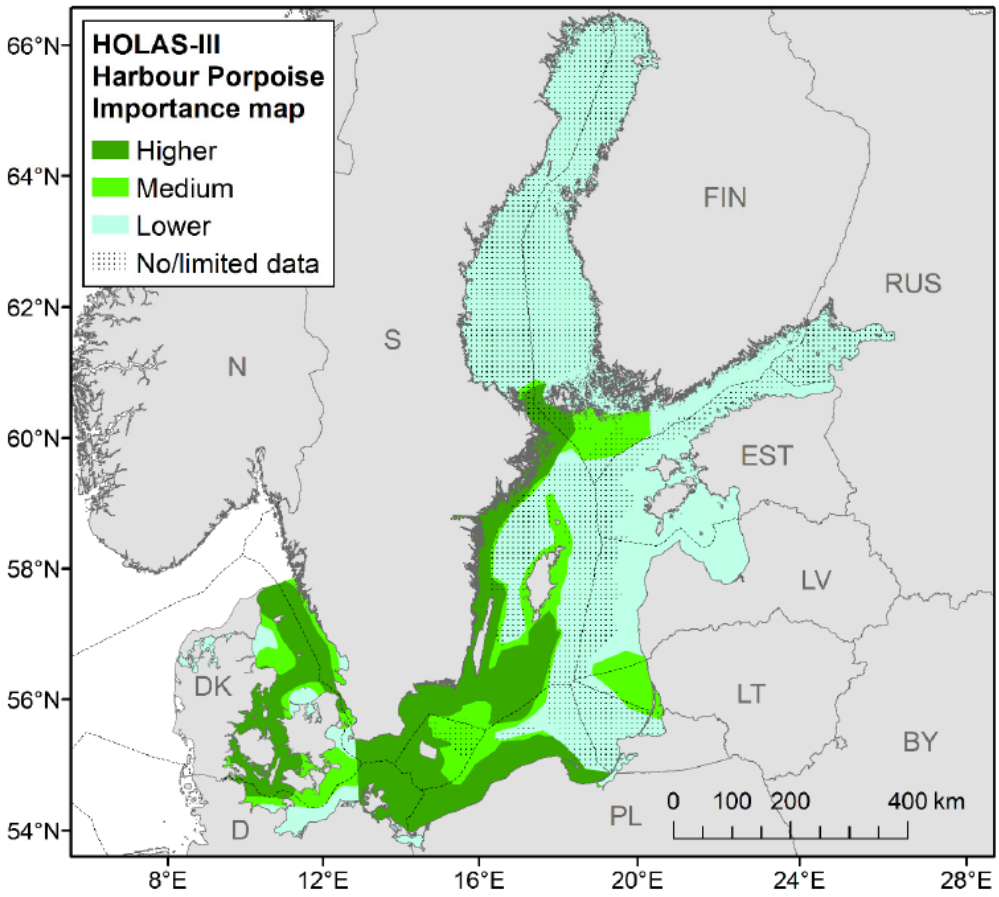

Figure A 3: Final HOLAS-III map of importance for harbour porpoises within the HELCOM area. Levels of importance are based on data from telemetry and visual surveys (Belt Sea), passive acoustic monitoring (SAMBAH and national surveys), and national expert judgement (Baltic Proper). (Source: Sveegaard et al., 2022). The seasonal management borders of the Baltic Proper population are not included here.

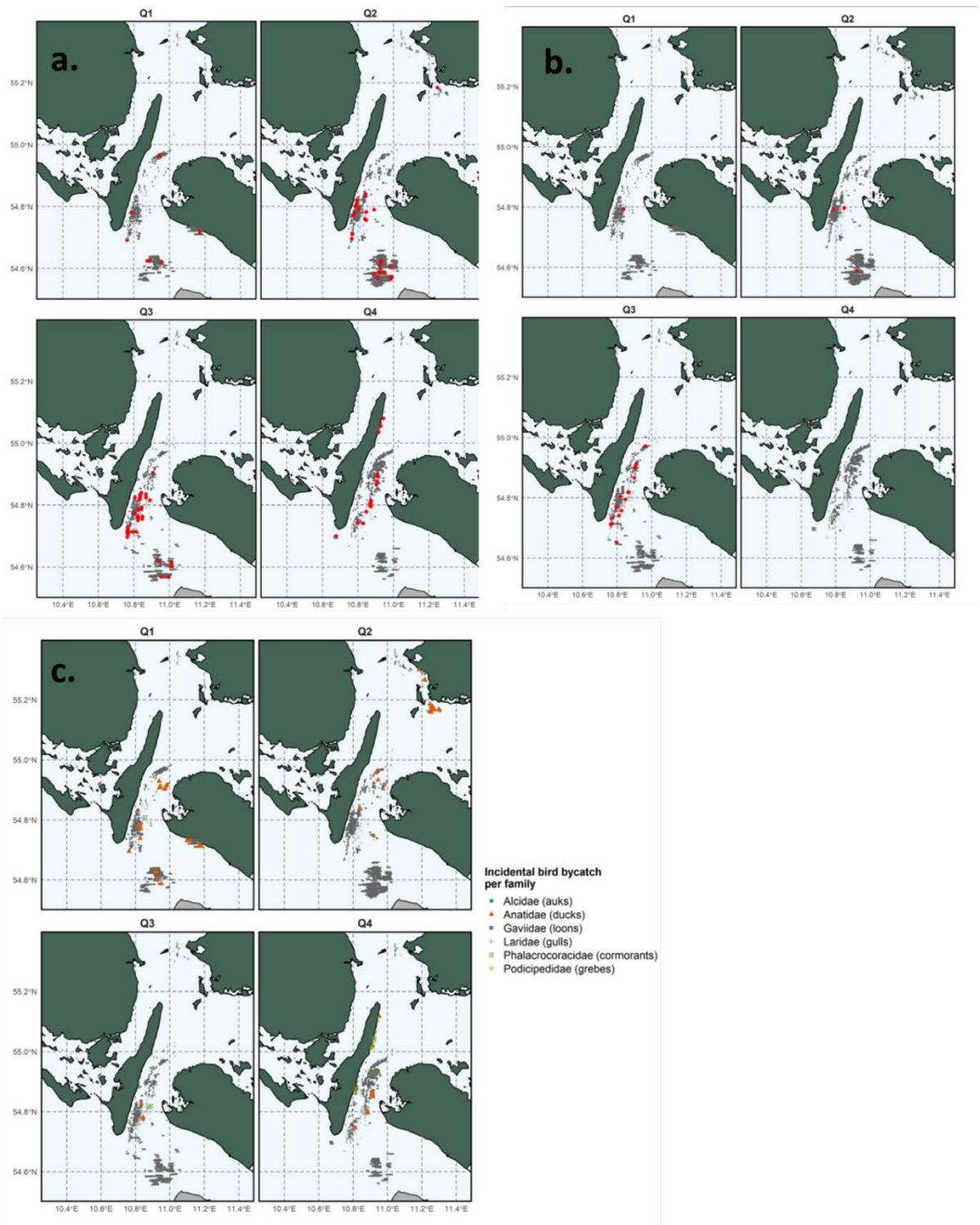

Figure A 4: Quarterly bycatch recorded using EM data on Danish commercial gillnet vessels (2010-2018) in the Belt Sea. Observed hauls are indicated as grey lines (After Larsen et al., 2021). a. Harbour porpoise (red); b. Seals (red); c. Seabirds, split by family (coloured markings).

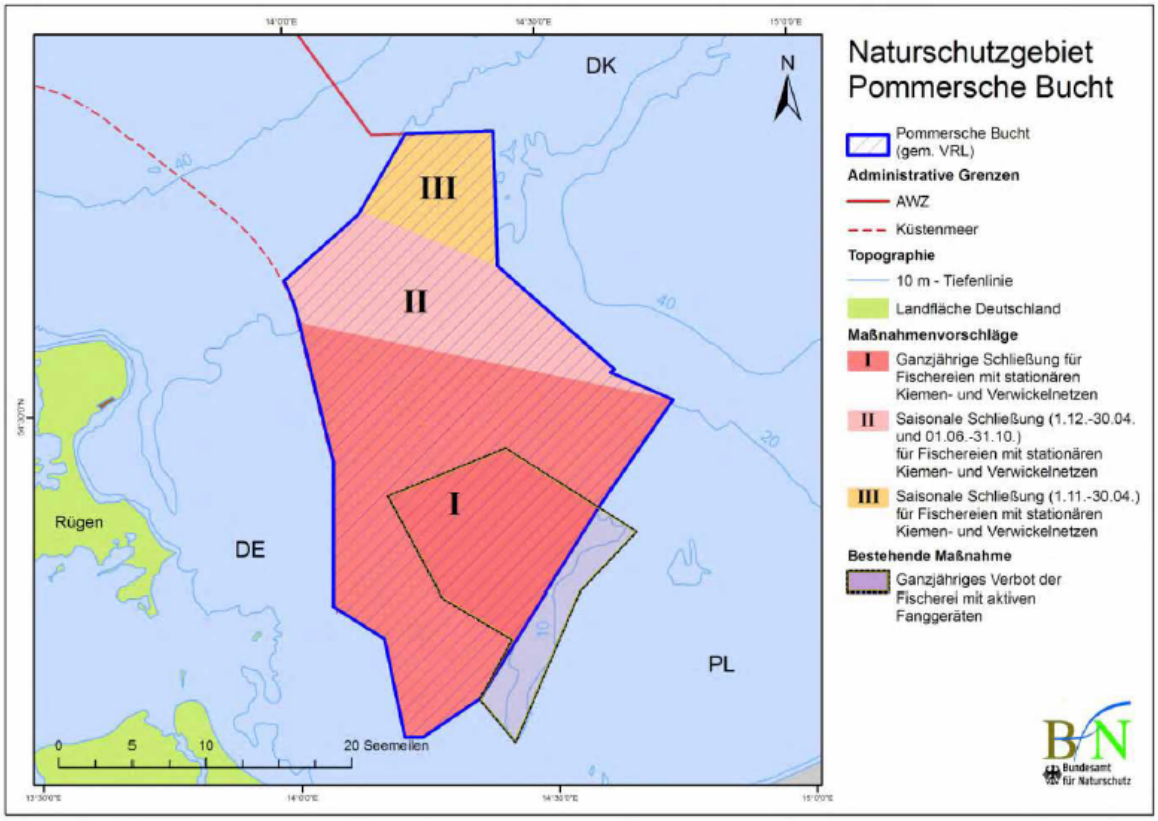

Abb. 1.11-11, Maßnahme 1: Ganzjähriger bzw. saisonaler Ausschluss der Fischerei mit stationären Kiemen- und Verwickelnetzen im Naturschutzgebiet Pommersche Bucht. **Teilgebiet I („Oderbank"):** Ganzjährige Schließung, **Teilgebiet II („Graben"):** Saisonale Schließung (1. Dezember-30. April und 01. Juni-31. Oktober), **Teilgebiet III („Adlergrund"):** Saisonale Schließung (1. November-30. April).

Figure A 5: Previously suggested management measures for static net fisheries in Pomeranian Bay NCA. Measures aimed at the protection of seabirds against bycatch (After: Sell et al., 2011, pg. 60).

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